Study on the Social Impact of ICT (CPP N°55A – SMART N°2007/0068)

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This document presents a summary of the main research findings from the 'Social Impacts of ICT' project. It starts with an overall description of the study objectives and approach, followed by a presentation of key results from the seven domains selected for analysis: participation in policy-making; education and lifelong learning; work; consumption; health; community and family; and creation and distributed innovation. A separate section looks into the main differences between developments in Europe and selected non-European countries, including the US, Japan and Korea. The report concludes with some generalizations and recommendations.

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1 Objectives of the Study

In recent years, information and communication technology (ICT) has permeated throughout the European society and economy, to an extent which nobody would have expected only a short time ago. Many observers believe that the fast spread of computer networks, mobile telephony and other ICT is having far-reaching, partly even transformative, implications for European society. Unfortunately, much of what has been said about ICT's social impacts has not been based on scientific insight but on guesswork, hype and 'common sense'. It is for this reason that the study on the 'Social Impacts of ICT', commissioned by the European Commission, DG Information Society & Media, has explored the available empirical evidence about developments in some of the most relevant domains in Europe, and beyond. This report summarises the study's main findings.

The European Commission pursues policies that aim to allow all citizens to participate in the knowledge-based society according to their needs and abilities. In March 2000, the European Council enacted the Lisbon Agenda as a main tenet of European policies, defining competitiveness, growth and employment as central goals of the European Union, combined with promotion of social inclusion and quality of life for all EU citizens. With regard to policies relating to the *information society*, the i2010 strategic framework 'A European Information Society for Growth and Employment' (adopted on 1 June 2005) stressed the need for 'an inclusive European Information Society that promotes growth and jobs in a manner that is consistent with sustainable development and that prioritizes better public services and quality of life'.

Digital literacy was identified as one precondition for people to fully benefit from the potential of ICT. A related perspective on learning has been reflected in a number of policy processes, including the Amsterdam, Lisbon and Stockholm processes. For instance, the Lisbon European Council, held in 2000, underlined the role of education and training for living and working in the knowledge society: 'The stepping up of the education and training drive in the European Union – in order to successfully assimilate the digital technologies and use them to best effect – is a precondition to the success of the Lisbon European Council's goals'. Apart from improvements relating to human capital, strategies for fostering economic and social development in the knowledge-based society also need to take account of what is often referred to as 'social capital'. Correspondingly, the European Council passed a 'Resolution on Social and Human Capital' in 2003.

It was intended that the aims of the Lisbon Agenda, as well as those of i2010, be achieved in the first decade of this century. Now, at the end of this time period, there is a need to identify realistic opportunities for European development over the next decade. This requires a critical assessment of the experiences until now. One part of such an assessment has to be a review of the social impacts of ICT, to which this study contributes.

As there are considerable differences in the extent to which ICT is utilized in different domains, and between different ICTs (ICTs = applications of ICT), seven such domains have been studied separately in this project: **Participation and Policy Making; Education; Work; Consumption; Health; Community and Family; Creation and Distributed Innovation.** Given strong differences are to be expected in the situation between Europe and those other parts of the world in which uptake of ICT is widespread (for example, North America, Japan and the fast developing countries of South-East Asia), the latter were dealt with explicitly in a separate piece of research.

Findings from the analysis of the Flash Eurobarometer conducted in early 2008 on 'Citizens empowerment through ICT', helped shed light, for instance, on people's perceptions on the positive and negative impacts of ICT use on their daily lives.

The social impacts of ICT were studied through four central themes derived from the extensive theoretical and empirical literature on this subject (described below). The results of the analysis, which was based as much as possible on empirical evidence (in particular from Europe, including the Flash Eurobarometer), have been documented in a set of eight domain reports which are being published together with the present document. In summer 2009, early results were presented to and discussed with selected international experts and representatives of the European Commission at a project workshop in Brussels. The results of this workshop, as well as feedback received through other channels including conference presentations and informal discussions with experts, were integrated into the reworked domain reports.

The main findings, including policy recommendations, are summarised in this report.

2 Approach

Recent years have witnessed a growing awareness of the potential impacts of ICT on the structures and dynamics of European society. Since the turn of the decade, researchers have made much progress in establishing solid evidence of the often highly complex ways in which the take-up and use of ICT has initiated, enabled or fostered processes of social change. While many leading thinkers painted either utopian or dystopian scenarios in the 1980s and 1990s (the decade that ended with the 'dot-com bubble'), what is developing now is a well-founded, empirical as well as theoretical, understanding of the real social impacts of ICT in Europe.

This research has shown that deterministic accounts of the effects which 'must follow logically' from the features of certain ICTs are ill-informed. For example, there are considerable differences not only in the extent of use, but also in the ways in which ICT is utilized across the member states of Europe, and the impacts deriving from them. There are also (arguably even bigger) differences in the social impact of ICT *between* different segments of society, which brings with it the danger that existing patterns of social exclusion may be reproduced or, even worse, new sources of exclusion introduced as ICT permeates throughout society. It is against this background that the present study was set up.

This study has tried to escape a number of frequently observed pitfalls in the estimating of the social impact of ICT. These pitfalls litter many popular (and also policy) conceptions of the opportunities and risks of new technologies. For example:

- the notion of a **technological 'fix´**, i.e. the belief that technology can be used as a simple solution to present society's most fundamental problems and conflicts.
- the notion of a **'total revolution'**, i.e. the assumption that new technologies will completely change or overturn basic structures of society (such as the concept, now silently dropped, of a 'new economy' which does away with the pains of the business cycle).

This study takes at its starting point the basic **societal trends** that can be observed in European society, rather than characteristics of the specific technologies per se (such as connectivity and convergence).

We first describe and analyze what has happened over the past 25 years in our selected societal domains (listed in the introduction), and then address the question of the impact of ICT on these events.

The conclusion we have reached, after screening the available empirical evidence from scientific observation, is that **the transformative potential of ICT generally is more of an evolutionary than a revolutionary nature.** When ICT plays a role as an enabler, it is

primarily for societally established applications. This is to say that the development of ICT is not some pre-given determination of history: in contrast, history strongly affects ICT development; and it does so not always in a way which is desirable from society's viewpoint.

To demonstrate this, one need only observe the **main trends in contemporary society** and explore the **role played within these by ICT**. For example, the perceived acceleration of societal processes, the increase in mobility and the trend towards economic globalization have all been greatly supported by parallel advances in ICT; but these 'megatrends' began long before computers and computer networks started to diffuse across the economy and society of the most technologically advanced countries. The same is true of other megatrends that have affected European society in recent decades, such as individualism and social inequality.

While this in no way rules out the possibility that important societal transformations have taken place on account of ICT, it does suggest that important insight can be gained by exploring ICT-related developments within the societal contexts in which they are embedded.

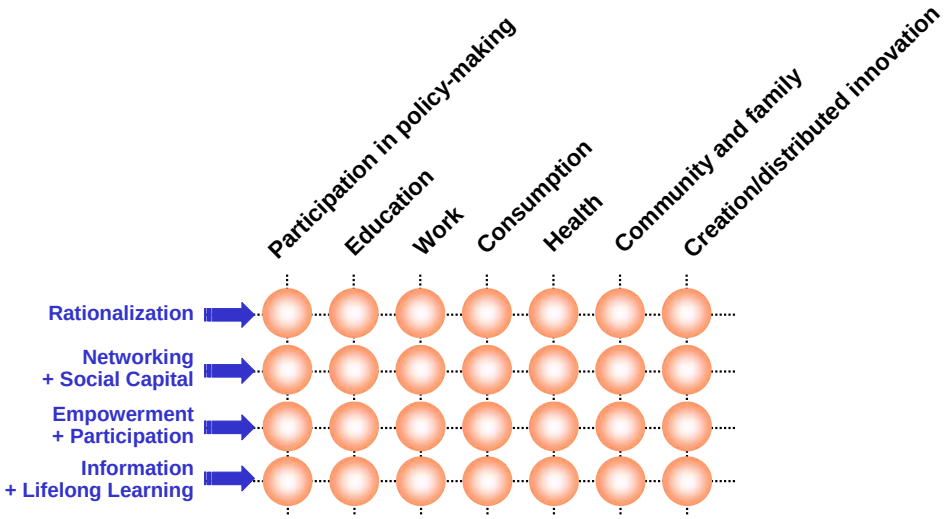


Figure 1: domains and common themes

To analyse the short- to long-term transformative effects of ICT, we developed a set of common themes and discussed them in the domain reports. These common themes represent very basic social (infra-) structural characteristics and goals of contemporary European societies. The four themes were used as analytical devices for describing the impacts of ICT in each of the seven domains:

- **Rationalization**, which denotes impacts on organizational aspects in the domain in terms of efficiency, effectiveness and innovation. The core focus here is on effects in terms of the speed, scope, reach and flexibility of interactions between societal stakeholders.
- **Networking and Social Capital**, which is about the extent to which ICT's unique capacity to enable network building has been exploited in the domain. This theme also touches upon the quantity and quality of relationships between people, i.e. the notion of 'social capital'.
- **Empowerment and participation**, which asks whether applications of ICT are changing power relations between societal stakeholders. Is there evidence of empowerment of individuals in their various roles (e.g. as citizens, consumers, patients, creators), and how does ICT relate to questions of social participation?

- **Information and Lifelong Learning**, which concerns the nature of the 'information society' in the domain. To what extent have applications of ICT in the domain changed people's capacity to utilise information in a process of continuous, lifelong learning?

3 FINDINGS IN THE DOMAINS

As outlined above, the study investigated seven domains. The main findings from each of these domains are described below.

3.1 Participation and Policy Making

Background

The focus of our work in this domain was the impact of ICT upon the possibility of citizens to make their voices heard in politics, and to shape concrete policies that have an impact on their lives. Drawing upon a definition of **e-participation** as 'taking part in and trying to shape public affairs', both government- and citizen-initiated applications were considered.

For a long time, governments have tried to encourage citizens to participate in policy making, and citizens have voiced a demand for more political participation. Both have been an increasingly important part of governance in modern democratic societies since the Second World War.

The rise of ICTs motivated visions of ICT use for political participation. In the 1980s, the 'tele-democracy' perspective of authors such as Christopher Arterton, Theodore Becker and Benjamin Barber saw ICT as an enabler of forms of direct democracy, imagining ICT infrastructure as a virtual Greek **agora**. In the early 1990s, this identification was replaced by a focus upon **virtual communities**, which were described as cures for the crisis of the traditional village and neighbourhood sociability.

Around the turn of the century, visions of a '**new democracy**' incorporated predictions of mass participation in politics and policy making via the Internet. Similarly, it was the expectation of the **Web 2.0** perspective (emerging after 2004) that citizens would increasingly contribute to policy making in all kinds of ways, and that a multitude of creative contributions of user-generated content would influence the way policy is being developed and shaped in Europe. Such optimistic visions are still to be found. However, one would be hard pressed to find any real-world influence of e-participation projects and pilots on institutional policy and politics, at least in Europe.

Key findings

ICT applications in the area can be clustered according to the different phases of the policy process: agenda setting, policy preparation, decision making, policy execution and policy evaluation. Taking this into account, e-participation is most frequently used in the first phases of the policy process: **agenda setting** and **policy preparation**. Some e-participation practice is also found in the **policy evaluation** area, where the initiative typically comes from individual citizens or civil society organizations.

Governments and public administrations rarely allow entries to the core decision making and policy executing phases. They usually claim that this does not correspond to the representative political system as it is in place in most EU countries, neither does it fit well with the responsibilities of public administration as they are currently understood.

The main motive for governments and public administration to start experimenting with e-participation is to **close the gap that is perceived to be growing between governments and citizens** and to boost the legitimacy of government policy and administrative decisions. So far, there is **no robust evidence that this has occurred**.

There is evidence to suggest that applications of e-participation which have sprung from the initiative of individual citizens or civil society organizations, often in conjunction with new media developers, have been more successful than those initiated top-down by governments. Applications of e-participation that appeal to the **everyday interests of citizens** in their immediate environment appear to have more appeal to them than initiatives that focus on issues of traditional politics and public affairs, which are often perceived to be abstract and far away. If designed appropriately, e-participation projects **increase awareness** about the capacity of the population to contribute knowledge and innovation for tackling societal challenges.

The networking capabilities of ICT opens the possibility that collective intelligence can be created and applied to make e-participation more effective. Indeed, many Europeans have taken enthusiastically to the possibilities offered by social software and Web 2.0 applications, and the extent of the online debate on all things political is indeed huge. Currently, however, peer-to-peer networking and the emergence of collective intelligence are more often found within civil society and between individual citizens (rather than between citizens and government), with **limited impact on the formal policy process.** In any case, such online practices are already proving effective for producing learning among participants, thereby contributing to **informed citizenship.**

In contrast to the modest impact of e-participation so far, e-government applications which focus on **improving the provision of government services to citizens** seem to fare much better. The share of Europeans (EU27) who use the Internet to interact with public authorities has increased from 23% in 2005 to 30% in 2009. User satisfaction research suggests that many individuals feel that the effort needed on their part for availing of government services has decreased significantly.

Table 1: Summary of social impacts in the domain "participation in policy-making" across the four study themes

Rationalization	➢ So far, e-participation has not resulted in cheaper and faster policy making. Multi-channel approaches remain necessary if all citizens are to be reached, and quality of input maintained. ➢ Hardly any influence of e-participation on institutional policy and politics. ➢ Most frequent use in agenda setting and policy preparation phases of the policy process. ➢ In contrast, e-government services have shown to be both popular and effective by easing interaction with administration. ➢ The common lack of explicit goals and targets means that the efficiency of e-participation is difficult to evaluate.
Networking & Social Capital	➢ The networking capabilities of ICT opens the possibility that collective intelligence can be created and applied to make e-participation more effective. ➢ There are examples of such collective intelligence emerging, but this requires certain mechanisms, stimulations and rules. ➢ Currently, peer-to-peer networking and emergence of collective intelligence are more often found within civil society and between individual citizens (rather than between citizens and government), with limited impact on the policy process.
Empowerment & Participation	➢ No evidence for overall effect of e-participation on perceived gap between governments and citizens.

	➢ However, trials show that citizens are prepared to embrace e-participation if they are convinced that their voice will be heard. ➢ Bottom-up and grassroot e-participation initiatives are more likely to be successful than top-down activities initiated by governments. ➢ Most administrations do not have mechanisms and capacities in place to cope with a significant increase in participation. ➢ E-participation has not (yet) widened the group of people who participate in public policy making. ➢ Those already engaged in traditional forms of political participation (a small minority of all citizens) are the most likely to engage in e-participation. ➢ This means an overrepresentation of high-educated and well-off citizens and, in some applications, an overrepresentation of males. ➢ A barrier to uptake of e-participation is that advanced digital skills are needed in addition to traditional citizenship skills, such as social skills and knowledge of decision making structures & processes).
Lifelong Learning	➢ E-participation is already proving effective for producing learning among participants, thereby contributing to informed citizenship. ➢ E-participation projects increase awareness about the capacity of the population to contribute knowledge and innovation for tackling societal challenges.

Implications for policy

- Government and public administration should be systematically scrutinised as to identify the processes and structures which would need to be adapted to effectively allow and incorporate e-participation, thereby fostering transparency and responsiveness.
- Governments should explore existing bottom-up and grassroot e-participation initiatives in their jurisdiction, and how these could be networked to broad initiatives for stipulating citizen participation in the policy process.
- The goals and means of e-participation projects should be articulated clearly. They should be evaluated systematically.
- The rights and responsibilities of all e-participation stakeholders (governments, civil servants, politicians, citizens and their organizations) should be made clear.
- More attention should be paid to e-participation in the area of everyday issues of citizens.
- For the time being, it is essential that initiatives for enabling political participation make use of multi-channel approaches, so that all citizens can be reached regardless of their digital literacy skills and type of online access. This should also apply to participatory activities of the European Commission itself.

3.2 Education and Lifelong Learning

Background

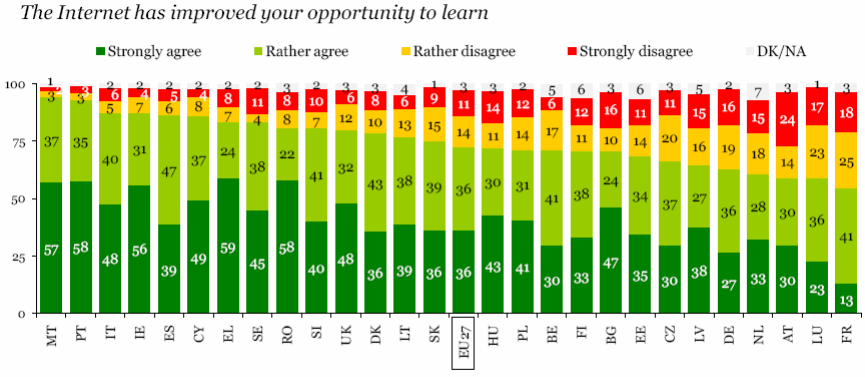
Due to the fast-changing technological environment, the individual needs to acquire new skills even after the time spent at formal educational organizations such as schools and universities. This need forms the basis of 'lifelong learning'. **Formal educational organizations are expected to prepare learners for lifelong learning**, as well as to make their organizational structures more supportive of this type of learning. Therefore, informal and formal learning are both addressed in our domain research on lifelong learning.

Early visions of computer use in education saw it as a means to effectively control learning and to automate teaching. In was only in the 1990s that the Internet fully changed the notion of the computer, and expectations regarding ICT and education. **Computer-based education** came to be seen as an opportunity for students to become socialized in future expert roles, and the early 'automation' vision of ICT and learning was replaced by a cooperation one. **Computer-supported collaborative learning** (CSCL) emerged as a new field in which students were no longer considered as mere consumers, but as people who would learn through 'practice about practice'.

Regarding formal education, the discussion became focused on the possibilities of **overcoming traditional barriers to access** to education services resulting from **constraints of distance, cost or time**. Because of the fact that education can be an opportunity to overcome marginalization, any ICT-caused lowering of the barriers to access to education and learning services was expected to result in social progress. Related services were implemented widely and today **students are able to manage their courses and access learning content from home**.

Key findings

ICT-based services have been implemented widely and today **students are able to study their courses and access learning content at any location as long as they are on-line;** in 2009, 70% of students used the Internet for education - related consultation, while only 8% did an on-line course in which traditional lectures are fully replaced by online transactions[1].



Most Internet users feel that the Internet has significantly increased their opportunity to learn. Much of actual learning taking place online appears to be incidental and often based on learning within communities of interest, rather than engagement in formal online training courses. *Source: EB Flash 241*

[1] Source: Eurostat survey on ICT Usage in Households and by Individuals

Web-based Learning Support Systems tend to increase learners' motivation[2] and increase teachers' involvement in the more delicate stage of the learning process. However it also loads the teacher with a higher time load[3].

In general, however, ICT in formal education seems to be more often used to **streamline bureaucratic procedures** such as contacting students, collecting homework, or organizing tests, rather than to support creativity and critical thought. The reason for this has to do with the focus of formal education on conveying an ever-expanding canon of knowledge, and too little on **enabling students to learn how to learn**. There still appears to be insufficient use of more advanced learning forms such as computer-supported cooperative learning, which now also includes the possibility to use of social computing in the classroom[4]. Furthermore, the available evidence on the situation in Europe suggests that formal education systems could do better to prepare pupils and students for ICT-supported lifelong learning.

Outside the rigid organisation of formal education, pupils, students and people in general learn on their own initiative, and through their own learning styles, while often making extensive use of ICT. 81% of the European students used the Internet daily or almost daily in 2009, up from 43% in 2004[5]. Students entering higher education today are likely to have mastered **web-based social networks**, their tools, conventions and etiquette. In 2008, 80% of students used Web 2.0 services, against only 35% among the population at large[6]. Mobile devices and the latest software tools are part of their daily life; **ICT-enabled informal learning has indeed become all but ubiquitous** for a large share of Europeans.

Outside of formal education people share knowledge, e.g., in **Networks or Communities of Practice** (NoP/ CoP). The CoP conception has pointed at informal opportunities of learning. Briefly speaking, a CoP demands for a joint enterprise, a shared practice and a common identity, while in a NoP, there is no joint enterprise. As a CoP is related to **self-organisation**, it cannot be "built" from outside, but possibilities for its emergence can be cultivated by a supportive environment for its operation. An example could be an informal community of nurses sharing knowledge through story-telling, being supported by the provision of a related meeting point. CoPs and NoPs may use the internet for their communication.

Informal knowledge-exchange in CoPs/NoPs has become important for acquiring necessary expertise, in particular, in ever-changing, ICT-rich environments. ICT-based education and training systems were therefore supposed to provide '**learning on demand**' services, i.e. services which offer learning material tailored to the real-time demands of the user at any given position in space and time. If such tailoring is not only reduced to technical accessibility, but includes the demand for a didactically reflected, user-related selection of content, knowledge about the users is required. Therefore, established self-organized communities such as in CoPs or NoPs have much more potential to tailor their ICT infrastructure than amorphous groups of anonymous users.

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2 Matsuo, Keita; Barolli, Leonard; Xhafa, Fatos; Koyama, Akio; Durresi, Arjan (2008): Implementation of new functions for improving learners motivation in a web-based e-learning system, Proceedings of the 10th International Conference on Information Integration and Web-based Applications & Services, November 24-26, 2008, Linz, Austria

3 Kunimune, Hisayoshi; Yokoyama, Kenzou; Takizawa, Takeshi; Fuwa, Yasushi (2008): Development and evaluation of a web-based asynchronous discussion system on e-learning materials, International Journal of Advanced Intelligence Paradigms, v.1 n.2, p.163-177, April 2008

4 European Commission, Joint Research Centre, Institute for Prospective Technological Studies (IPTS), Seville, Spain (without year): Learning 2.0 – the use of social computing to enhance lifelong learning, URL: http://is.jrc.ec.europa.eu/pages/Learning-2.0.html, accessed 2-4-2010

5 Source: Eurostat survey on ICT Usage in Households and by Individuals

6 "Advanced communication services", source: Eurostat survey on ICT Usage in Households and by Individuals

To tailor learning infrastructures, user knowledge and needs must be detected. In this context, **informal learning should not be understood as non-institutional learning**: institutions may be helpful, even necessary, to address and understand user needs, and thus to bring formal and informal learning together – even if it may be new institutions, certification and remuneration of learning, teaching or coaching, that are demanded.

To fully participate in a society in which learning typically takes place in ICT-supported environments, **direct ICT-related skills** are required. A major challenge results from the fact that the largest part of Europe's older population has no experience in using ICT, either from school or from work practice. In 2009, 52% of Europeans aged 55 to 74 had never used a personal computer, and 59% of this age group had never used the Internet. The figures are down from 61% and 73%, respectively, in 2005, but lack of user experience still the norm rather than the exception in this age group[7]. They run a danger of **exclusion from the possibility to engage in a lifelong process of learning**, and thereby also from social life in general.

Apart from **technical (operational) user skills**, people also need **digital literacy skills** such as information and strategic skills, which go far beyond the mere capacity to master a personal computer and to browse the Web. Strategic skills include, for example, the ability of critical thinking, such as in the context of evaluating results of information searches on the Web. In the face of an explosion of information availability, caused mainly by the success of the Internet, a deliberate and critical attitude towards information and media must be learned and cultivated.

There is some evidence to suggest that **Europeans at risk of social exclusion tend to lack digital literacy skills more than they suffer from a lack of operational skills**. Performance tests have shown that mastery of operational skills is reasonably widespread, but that average performance concerning information and strategic skills on the Internet is far below expectations. The latter even applies, as a recent skill assessment study in the Netherlands showed[8], to the younger generation, which is often assumed to be 'digitally native' almost by default.

When implementing ICT, organizations are advised to implement the role of "user advocates", responsible persons for ICT-related micro-regulations. A lot of small and medium-sized enterprises, however, have little specialization of responsibilities. Here, empirical studies identified the emergence of informal roles such as "IT gardeners", individuals who become informal contact points for seekers of ICT-information. Due to their generally highly beneficial role, such emergent roles should be supported by the organizations and by politics, as well. Their competence formation can be supported by means of online information offers, their motivation by institutional frameworks which, for instance, may certify their qualifications: informal learning does not necessarily mean un-institutional learning. At the other side we need to admit that institutional informal learning is a rare phenomenon.

Table 2: Summary of social impacts in the domain "education" across the four study themes

Rationalization	➢ First generation e-learning conceptions followed a very narrow understanding of rationalization when attempting to optimize learning. The same was true for organizational learning based on first generation knowledge management systems. ➢ Most studies agree that, where ICT has been implemented in the education system as a means to legitimate cuts of educational budgets, the quality of education has suffered.

[7] Source: Eurostat survey on ICT Usage in Households and by Individuals

[8] Van Deursen, A.J.A.M. & Van Dijk, J.A.G.M. (2009). Using the Internet: Skill Related Problems in Users' Online Behavior. *Interacting with Computers, 21*, 393-402.

	➢ Critical theories of learning point at unused potentials of ICT to promote the creativity of users, e.g., in Computer-Supported Collaborative Learning. Related efforts are not directly related to the rationalization of education, but as sustainable rationalization demands, among others, for creative individuals, there is a strong indirect relation.
Networking & Social Capital	➢ A lot of today´s learning happens outside of formal education. ➢ To keep track with the fast development of society, peer relations play a major role in learning. Socio-cultural processes of enculturation in expert communities are important for motivating, structuring and promoting learning. ➢ One example for informal learning in networks is the Community of Practice (CoP) among individuals, who share a common enterprise, joint vocabulary and some common practice. ➢ CoPs have become most important for learning in volatile, complex environments, where narrow disciplinary forms of experience are not enough. ➢ Aside from CoPs, other forms of knowledge sharing have emerged, for instance, within Networks of Practice (NoPs). Such emerging structures support the learning of individuals. ➢ ICT plays an increasing role for the communication and coordination of learners, but of educators, as well.
Empowerment & Participation	➢ The implementation of ICT may function as a dequalification and disempowerment of individuals without ICT skills. They run the danger to become excluded from information, communication, collaboration and decisions. E-inclusion is important. ➢ For the users, ICT may enable new forms of participation and empowerment in education. For example, telelearning opportunities can benefit individuals, who otherwise would not have the time for learning. E-learning platforms, for instance, allow students from rural areas to better organize their studies. ➢ ICT may contribute to more practice-oriented education, when it is used, for instance, to stay in touch with alumnis, former students, which on the occasion of invited talks or alike later may contribute their practical experience to education. ➢ ICT may support learning for disabled individuals, only to mention blind or deaf people. Related programs should be even more stressed, such as measures dedicated to accessibility.
Lifelong Learning	➢ The spread of ICT introduces a range of new skills which users need to acquire before they can make effective use of ICT applications. At the same time, advances in ICT were used to improve the effectiveness of education and training systems themselves, as in the field of e-learning. ➢ There are different skill requirements to be met in order not to become excluded from the benefits of the information society: there are the operational skills, for instance, knowledge about which key to press, but also more demanding skills such as information skills and strategic skills: what can I do with which application, and how can I use information and communication for helping me achieve my goals? ➢ Media competence also requires critical reflexivity, for instance, in regard of knowledge searches. Such critical thinking has to be supported by continuous, lifelong education, as media-related skills outdate faster than ever before. ➢ In order to become more adaptive for technological innovation, organizations may benefit from supportive roles for innovation facilitators. Such roles may be supported by appropriate certificates, which are a challenge for vocational-education institutions.

Implications for policy

- ICT has enabled new forms of learning outside of schools. Educational policy should commit schools to better prepare pupils for the needs of lifelong learning.

- Social and educational organizations should be encouraged to put more emphasis on supporting critical reflections of the learners ('learning how to learn').
- e-Inclusion must not focus on ICT access alone (barrier-free access remaining a major issue for disabled persons), but also on operational skills and more advanced forms of digital literacy.
- Learners who run the danger of becoming marginalized should be supported.
- While existing institutions in the education system might be tempted to implement ICT as a means to push through cost savings, the technology will only provide long-term benefits if the implementation is accompanied by investments in training and organizational development.

3.3 Work

Background

In this domain, we analyzed the impact of technological change on work life over the last 25 years. The implementation of ICT in the work domain has generally been accompanied by a **restructuring of organizational processes and division of labour** at the inter-individual, inter-group or inter-organizational level. We, therefore, had to investigate the role of ICT in new interaction forms in such diverse fields as industrial clusters, company networks, virtual teams, global management and off-shoring, but also in established interaction forms. The quality of work and working conditions in Europe are affected by a range of **contingent factors** such as the supply and demand of work, the cultural value of work, the forms of unemployment (and precarious employment), and social circumstances such as the opportunity for part-time work, work-life balance and the qualifications and skills needed for up-to-date jobs.

As regards ICT and work, **utopian visions** (e.g. 'computer-integrated manufacturing' (CIM) or the 'paperless office') envisaged a positive role of technology in the work domain, while **dystopian visions** predicted mainly negative ones (e.g., 'capitalism without work'). Early expectations tended to predict widespread de-industrialization as a consequence of the penetration of ICT-based production methods. The 'post-industrial society' and 'post-Fordist' developments in the work domain were contrasted with earlier paradigms such as 'industrialism' and 'Taylorism / Fordism'.

With the World Wide Web evolving during the 1990s, the emerging discourse on the 'Information Society' was strongly influenced by the aforementioned debates. Nevertheless, researchers agree that **industrial production still plays a vital role for the European economy,** implying that Europe is better understood as a modernized industrial society rather than a post-industrial one. Employment problems have not been overcome in recent years, but Europe is also far away from 'capitalism without work'. There is broad consensus among researchers that ICT as such has not been the main cause for the persistent problems of permanent unemployment and precarious types of work.

Changes and developments in ICTs are correlated with transformations of work forms in European countries on the level of individual jobs, but also on the level of coordination and organization. These changes have been accompanied by **changing demands and requirements** placed on workers with regard to their qualification and skill level, among others, but they also offered **new possibilities for job enrichment and worker empowerment**.

Key findings

Generally speaking, technological change in the work domain has been dramatic during the last decades. Aside of ICT diffusion and adoption in **information- and knowledge-intensive areas of work**, ICTs have gained increasing importance within work realms which at first sight seem little technology-prone, for example: agriculture and fishing, manufacturing, and mining and construction, to name only a few. Nowadays it is hardly possible to find any area of work in which ICTs are not of any relevance in one way or another, but **such ICT is often not directly visible** (e.g. micro-computers in cars controlling car repair and maintenance intervals, and similar devices). Furthermore, **ICT-based industries and services**, which have not existed before, have rapidly grown.

ICT has enabled new ways for companies to gain, process, store, and distribute information. Organizational processes in companies have been re-engineered, for example, by implementing **Knowledge Management** (KM) systems, **Enterprise-Resource-Planning** (ERP) systems, or **e-learning platforms**. Moreover, the division of labour within or between organizations (which had been growing even before the arrival of digital ICTs) was affected by the introduction of ICT applications. Prominent examples are inter-individual, inter-group or inter-organizational **tele-cooperation**, **industrial clusters** and **company networks**, **virtual teams and organizations**, and **off-shoring**, which often would not have been possible without ICT.

The role of ICT has sometimes been indirect, and often unanticipated. For instance, while ICT was seen as potentially reducing work-related travel needs (for instance, by means of **telework**), Internet job offers could indirectly contribute to more awareness about trans-regional labour-market opportunities and thus motivate a **growing mobility of the workforce**. Even regarding the core effects, the picture is ambivalent: The implementation of ICTs often contributed to **job enrichment** and increasing **work satisfaction**, especially for jobs with a certain freedom of self-organization. However, it could also lead to the replacement of human labour by automates, or to **neo-Taylorist work forms** such as, for instance, in call centre work.

In consumption, blurring boundaries between consumers and producers have in some cases led consumers to become "**prosumers**", as they contribute significantly to the development of products they subsequently consume. Respective examples generally refer to a business culture which supports active user-orientation (for instance: Wikipedia) and have shown considerable potential in successful cases. However, such examples remain exceptional when considering the entire European work domain, and it is certain that in the foreseeable future, most production work will continue to be carried out in the form of paid work.

The real-life impact of ICT on the work sphere depends very much upon the **implementation method** and the related **micro-policies of innovation**. If ICTs are to support existing competences (rather than automating them), there is a need for **staff participation** to allow the new technology to be fully appropriated. In this context, tailorability is key: If ICTs used in the organization of institutions are not tailorable, they may not be adapted to the needs and competences of the work force, but, to the opposite, require a one-sided adaption of the work force to technological development: indeed a central de-empowering and de-qualification effect. However, maximum tailorability does not necessarily imply an optimum situation, as it may lead to additional demands placed on workers. **Contextualized technology**, **participative implementation**, **qualification** and the **cultivation of supportive roles** in organizations are needed in order to successfully reduce this danger.

Some of the expectations related to ICT did not materialise, and some trends emerged which had not been anticipated. Given such diversity of effects, much empirical research on the social impact of ICT has concentrated upon completely new and therefore easily identifiable

forms of technologically enabled cooperation and communication. Research on telework and e-work has provided first insights into opportunities and problems relating to ICT in the work domain. Much research on telework and eWork has focused on personal-computer use and white-collar work, although new ICT fields (e.g., ubiquitous, ambient or mobile computing, or the 'Internet of Things') have consciously abandoned the desktop paradigm and have targeted the work sphere of blue collar workers.

Table 3: Summary of social impacts in the domain "work" across the four study themes

Rationalization	➢ Attempts to isolate the direct impact of ICT on labour productivity have not found a modest positive effect, but either very high or little or no productivity effects. ➢ The effect of ICT investments on productivity appears to be very positive, when it is coupled with effective organisational changes, in particular, if these imply an increase in worker participation, self-responsibility and job autonomy. ➢ ICT has also played an important role in enabling neo-Taylorist types of work, e.g. in call centres. In these cases, employers benefit from a reduced demand for skilled workers, while employees do not. ➢ RFID as well as other ubiquitous and pervasive-computing technologies will further strongly affect blue-collar work. ➢ Rationalization can have different forms in the work domain. It is either based upon a mere automation approach addressing cost reduction ceteris paribus, or oriented towards the use of work-force competences for innovative forms of value generation. ➢ Service-enhanced better products are needed, if the rationalization effect of ICT-implementation is not to lead to a negative growth of the European economy. ➢ There is some evidence that rationalization in Europe does not necessarily demand for the largest ICT-industry, but for the most productive appropriability of ICTs.
Networking & Social Capital	➢ ICT has enabled an increasing degree of networking both within and between organisations. ➢ This includes virtual organisations which exist of networks and communities where the members are spatially distributed and mainly collaborate with one another online. While the actual number of "pure" virtual organisations in Europe is small, many companies have taken on some of its features. ➢ Open Innovation makes strong use of ICT networks for accessing global, highly decentralised and unstructured pools of knowledge. ➢ Peer production has emerged as an important new way of organising work. In open source software (OSS) projects, for example, users contribute their skills, expertise and personal engagement to a collective effort, here: to create software. An example of peer-produced applications is Eclipse.
Empowerment & Participation	➢ User participation in the development of work-related ICT systems & applications (participatory design, end user development) has been shown to increase worker motivation. ➢ Such activities are more successful if they are supported by the building of communities in which end users can effectively share their knowledge and experience with their peers. ➢ Spread of ICT in the workplace domain contributed to new roles, some of which combine operative and managerial functions in one person. ➢ The "labour-entrepreneur" is said to be based upon self-economization. There is evidence, however, that he/she represents more a niche phenomenon restricted to specific branches and organizations (mainly SME in the ICT branch): the bureaucratic character of mainstream business organizations limits the space of new work roles. ➢ Telework is a chance, but also a threat for work-life balance. It is seen more positive by those for whom it is not their only work form. In general, telework has remained a more

	peripheral phenomenon in the work domain. ➢ Blurring boundaries between consumers and producers might affect their relationship: in some cases, consumers become enabled to contribute significantly to the development of products they subsequently consume. In the work domain, this form of consumer empowerment might have positive job-enrichment effects, but it may have detrimental effects on the number of jobs, too.
Lifelong Learning	➢ The implementation of ICT has increased the qualification demand on the work force. Although this is obvious, there are often too little qualification measures when new technology becomes implemented. ➢ A lot of learning happens in Communities of Practice (CoPs) or Networks of Practice (NoPs). Their members may exchange knowledge and experience online, thereby fostering processes of individual and collective learning. ➢ Work-related Web2.0 applications have made it much easier (in a technological point of view) to create a COP. The shift in work organization which may be necessary to become able to benefit from CoPs is much harder to be achieved. This needs to be studied further. ➢ ICT is often used to support information exchange and knowledge management within organizations, sometimes obviously at the disadvantage of formal vocational training. ➢ Learning-by-doing and informal learning are important in the work domain. For unemployed individuals this means that they are not only deprived from financial, but also from informal qualification opportunities. A combination of communal community centres and ICT-based networks could be helpful. Related opportunities demand for research. ➢ Informal learning does not necessarily mean un-institutional learning. It may be supported by certificates, remuneration of educational teaching or coaching, and similar.

Implications for policy

- Despite massive technological change, unemployment and precarious employment have not been overcome. ICT implementation has contributed to labour-saving automation as well as to new rounds of product and process innovation which have created new jobs. ICT development, adaptation and maintenance have become the nucleus of a branch with considerable employment. The net effect of ICTs on the labour market should ongoingly be monitored in order to pinpoint areas of structural strengths and weaknesses in the EU economy.
- ICT has led to work enrichment in many existing jobs, but also led to Neo-Taylorist work forms. Technology policy for the Information Society should promote technologies that support the competences of the work force instead of substituting them.
- ICT has a lot of potential for innovative strategies such as Complex Products or Open- / User Innovation (e.g. as End User Development), which need adaptable technology, contextualized implementation and supportive organizational environments. The deployment of such strategies calls for a combination of technological and organizational development, which should be supported by technology policies.
- Participation is the best measure for social inclusion of vulnerable and marginalized persons (e.g. senior staff, for which ICT has a great potential to smoothen or delay the shift to retirement). More training of staff may be beneficial, but to involve the users of technology in the development of usable and competence-enhancing technology is generally preferable to adapting them to barely usable infrastructures and tools only afterwards.

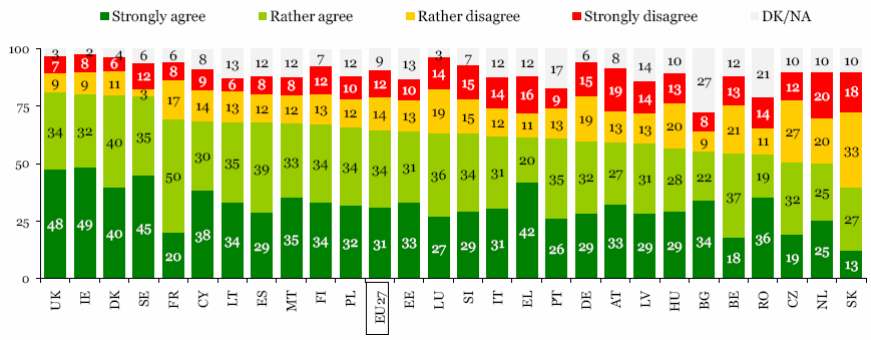
- Staff participation in the enterprise decision-making processes (which has proven to be successful in some European countries) is the more beneficial, the more the economy needs to be intelligent and sustainable. It should be supported on the European level, too, and become an element of the Information Society in Europe.
- The acquirement of ICT skills has often happened by means of informal learning, as a result of individual efforts, but also in CoPs and NoPs. The latter are of particular importance for knowledge diffusion and innovation. Efforts that enable workers and unemployed persons to benefit from CoPs and NoPs and to get learned skills and competences certified should be supported.

3.4 Consumption

Background

Full participation in society is partly determined by an individual's capacity to be an informed and active consumer of goods, a capacity that may not only be influenced by ICT, but also by the existing market situation. In order to be able to shed light on the transformations which occur in the domain, the analysis needed to cover both tangible and intangible consumer goods.

Early expectations assumed that consumers would benefit from greater choice, lower search costs and, more generally, increasing power vis-à-vis suppliers within the new markets in e-commerce and the Internet. Most experts furthermore believed that the role of inter-mediators (i.e. middlemen such as agents, brokers, wholesale vendors) would be greatly reduced or even cut out, while consumers would benefit from falling prices. While this was applauded by many observers, others voiced a concern that the more direct link between suppliers and consumers would accelerate the consumer industry's grip on society.



Online consumers are perceived to benefit from more opportunities to get a better deal online. *Source: EB Flash 241*

Key findings

The share of Europeans (EU27) who ordered goods and services online at least once in three month has increased from 15% in 2004 to 28% in 2009[9]. Roughly the same percentage makes regular use of e-banking (16% in 2004 and 32% in 2009). A considerably larger number of Europeans use the Internet for finding information about goods and services pre-purchase: Their share has increased from 34% in 2004 to 51% in 2009.

There can be little doubt then that the Internet has become fully integrated in the consumption-related behaviour of major share of Europeans.

[9] Source: Eurostat survey on ICT Usage in Households and by Individuals

What is the role that ICT plays in supplementing or substituting existing forms of consumption? On the supply-side, individual online retailers have become major players in their field. Still, overall there is little empirical evidence that ICTs have changed consumer behaviour in a fundamental way. The main difference appears to be a change in pre-purchase and post-purchase consumer behaviour, which implies that consumers have become better informed prior to purchase, and that they have become more active, after purchase, in reporting and exchanging experience with goods and services.

In this context, Web 2.0 related applications and website features such as user ratings, peer-produced recommendations, collaborative tagging and social indexing, are significantly enhancing market transparency for online users who possess the necessary (strategic) literacy skills. The power of such applications rests on them exploiting the networking capabilities of the Internet. The share of the population engaging in the peer-production of consumption-related knowledge is likely to be much higher than the number of people who have engaged in comparable off-line activities before widespread diffusion of the Internet.

All of this has made suppliers and retailers seek to become more responsive. In addition, suppliers and retailers themselves make extensive use of the Internet for marketing purposes, which can compromise consumers' efforts to peer-produce independent knowledge on products and providers. An example of such practice is viral marketing, in which advertisers spread marketing messages, disguised as the independent opinion of an individual, through social networks.

A few areas of instrumental consumption have seen a massive shift to online transaction, which to some extent has replaced brick-and-mortar retailing. Examples include consumer financial services, travel services, recorded music, and computer software.

ICTs and the Internet have reduced the costs of many types of transactions. In particular search costs have fallen dramatically, which has made 'shopping around' much easier. **The Internet has thereby enabled new markets** which had not been sustainable before because of prohibitive transaction costs.

Online shopping can also be a form of entertainment itself, which means that a considerable part of emotional consumption is now also taking place in the home, much supported by increases in broadband diffusion.

However, **the predicted death of the intermediary** due to an assumed preference of consumers for price advantages **could not be confirmed** across the board. The emotional experience of buying and the higher confidence in face-to-face settings for consumption remain important. Instead there seems to be a shift of consumer behaviour towards consumption at home ('domestication') at the same time as there is an increasing integration of consumption in other everyday activities. The demand for local, personalized products and services reflects an increasing demand for niche products.

Moreover, perceived problems with delivery and post-purchase service of online retailers mean that many consumers feel face-to-face settings give more confidence.

Confidence in online commerce is harmed by illicit online behaviour, for which spam messages are an obvious example. Most spam today represents an illegal, but commercially successful marketing effort made possible by the low costs of communication over the Internet. From the viewpoint of consumers, spam causes indirect costs (for all users) and considerable risks (for those who fall for the offers being made).

This is one of the reasons why Internet users need to obtain and continuously update skills in dealing with the risks of online transactions. More than ever before, being a confident consumer in the information society requires a considerable degree of lifelong learning.

The spread of ICTs is also related to the blurring of boundaries between consumers and producers, and between consumers and retailers. It has become much easier for consumers to produce and sell as well as to passively consume. 10% of Europeans (EU27) have used the Internet to sell off goods or services, e.g. via online auctions, in 2009 – twice as many as in 2004[10]. Web 2.0 technologies have also given consumers unprecedented opportunities to join into communities of interest, to contribute own content related to products and to create new products in collaboration, all of which were previously the realm of experts. The term 'prosumer' is used to describe this phenomenon, which is linked to a general increase in interactivity between consumers and the production system.

Table 4: Summary of social impacts in the domain "consumption across the four study themes

Rationalization	➢ While individual online retailers have become major players in their field, overall there is little empirical evidence that ICTs have changed consumers' behaviours fundamentally. ➢ Some areas of instrumental consumption have seen a massive shift to online transaction, which replaces brick-and-mortar retailing. ➢ A considerable part of emotional consumption is now also said to be taking place in the home due to the increase in broadband diffusion. ➢ Still, for emotional as well as some instrumental consumption other factors beyond efficiency and lower costs have helped maintained traditional patterns of consumption, e.g. confidence in face-to-face settings for consumption remain important. ➢ Lest it be forgotten, most spam today represents an illicit, but commercially successful marketing effort made possible by the low costs of communication over the Internet. From the viewpoint of consumers, spam causes indirect costs (for all users) and considerable risks (for those who fall for the offers being made).
Networking & Social Capital	➢ Web 2.0 related applications and website features such as user ratings, peer-produced recommendations, collaborative tagging and social indexing, significantly enhance market transparency for online users who command the necessary (strategic) literacy skills. The power of such applications rests on them exploiting the networking capabilities of the Internet. ➢ The share of the population engaging in the peer-production of consumption-related knowledge is likely to be much higher than the number of people who have engaged in comparable off-line activities before widespread diffusion of the Internet. ➢ Suppliers and retailers make extensive use of the Internet for marketing purposes, which can compromise consumers' efforts to peer-produce independent knowledge on products and providers. ➢ An example of such practice is viral marketing, in which marketing messages, disguised as the independent opinion of an individual, are spread through social networks.
Empowerment & Participation	➢ E-commerce and other online services have opened up a range of possibilities for people whose ability to take care of personal business and transactions used to be constrained, e.g. because of functional restrictions, geographical location or lack of time. ➢ Specialised services such as price comparison sites, together with better overall access to information from and about suppliers and products, have significantly increased the ability of consumers to obtain information prior to purchase. This is reflected in widespread perceptions of empowerment. ➢ Web 2.0 technologies have also given consumers unprecedented opportunities to join into communities of interest, to contribute own content related to products and to create new products in collaboration, all of which were previously the realm of experts.

[10] Source: Eurostat survey on ICT Usage in Households and by Individuals

	➢ While in some markets traditional intermediaries such as travel agents have almost completely disappeared, new intermediaries have appeared in others, including price comparison websites or search engines.
Lifelong Learning	➢ Widespread take-up of the Internet means that access to content which can effectively support self-learning has become much easier. ➢ Indeed, empirical evidence indicates that most Internet users perceive the Internet to be supporting them in informal learning. ➢ Being an informed online consumer requires new skills, e.g. in order to prevent consumers from falling for online fraud and other types of risks originating from commercial interests.

Implications for policy

- Technological change has enabled products and patterns of distribution and consumption to become much more flexible, complex and diversified. This has often led to more choice for consumers, but also to more occasions for fraud and for violation of basic consumer rights.
- The re-emergence of intermediators has been one indirect result of this experience, as consumers seek trustworthy institutions in an increasingly complex market environment.
- A main area in which policy intervention appears to be necessary is in finding a good balance between consumer rights, consumer information/education, and the interests of suppliers.
- Recent years have made it obvious that consumer rights and other (industry and government) regulation to protect the consumer from fraud and deception have to be modernized in order to keep track with market developments.
- Technological change can be blocked by deficits in the legal framework: lack of clarity in consumer rights can hold back e-business from becoming a mass market.
- However, the rapid development of the online economy (as reflected in a continuous emergence of new business models) implies that people cannot rely on legal frameworks alone if they wish to participate in the benefits while avoiding the risks of products and services traded online.
- There is a strong need for a strategy for developing consumer skills, in particular targeted at those groups which are most at risk of commercial exploitation, such as children, people with limited digital skills, and people with generally low literacy levels.

3.5 Health

Background

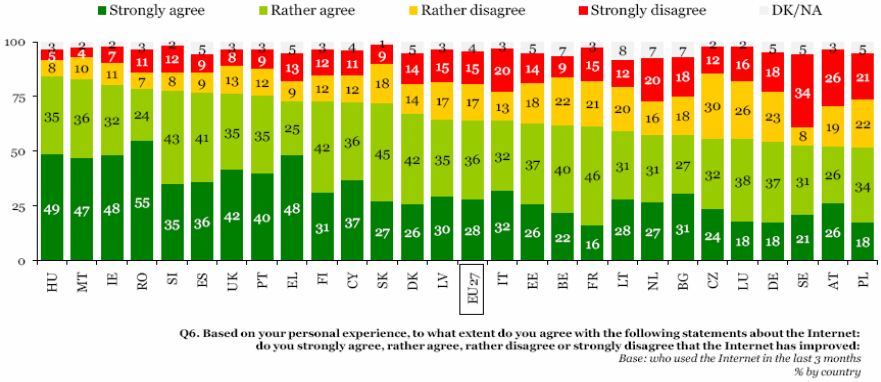
In the health domain, our focus was on applications that are directly utilized by consumers/ patients in some manner, especially 'health-on-the-web', but also ICT-based health and social care in the home, mobile telephony for health purposes and various other applications of ICTs to support healthcare communications and transactions.

As regards early expectations for this domain, it has not been easy to discern a commonly-held and coherent perspective or ‘vision’, this being a reflection of the very complex mix of activities, players and interests that are involved in healthcare. Generally speaking, there

were early expectations that ICT would 'join up' and integrate the healthcare system. However, the evolution of applications of ICT in health has tended to be slow. The same can probably be said of the expectation that consumer health informatics would radically empower consumers / patients and transform the relationships and power balance between healthcare professionals and patients.

Key findings

Nevertheless, **usage of the Internet by the general population for health-related matters** has been growing steadily in Europe over the past number of years, although there are still wide variations across countries. The share of Europeans who used the Internet in the previous three months to seek health information on injuries, diseases and nutritional issues has increased from 17% in 2004 to 33% in 2009[11].



There can be little doubt that most Internet users feel they benefit from better access to health-related information. There has been little research yet, however, on what less dependence on health professionals may mean for the overall health situation of the population. *Source: EB Flash 241*

The Internet has made a lot more health information available, and more easily available, for consumers / patients. This includes both **Health 1.0** applications providing structured health information for the public, and user-driven **Health 2.0** applications based on the new social media. However, the quality may be variable and there can be risks of overload so **good 'e-health literacy' skills are needed** in order to get the most of this.

The 'long-tail' of the Internet has provided unprecedented possibilities for consumers / patients to get in touch with and share experiences with others who have similar health conditions – even the rarest. This increased access to social capital may provide the type of **social support** that has been shown to improve health experiences and outcomes, although more research on the comparability of online and traditional face-to-face support is needed.

Whilst consumers / patients vary in their desire for choice and influence in relation to health matters, the evidence suggests that **many feel more empowered** as a result of being able to find health-related information and support on the web. Most consumers/ patients who look for health information online report being better informed, and this can be brought to bear when making healthcare decisions and in interacting with doctors. They also have the possibility to use online rating sites to record and voice their experiences of health providers they have used. On the other hand, the Internet has **extended the reach of various vested interests** and their potential to influence consumers / patients, for example, in the advertising and marketing of medications. Some e-health applications also raise the possibility of increased transparency of customers to vested interests such as insurers.

[11] Source: Eurostat survey on ICT Usage in Households and by Individuals

Many people are now researching health information before and after consulting their doctor, and a minority report having made their own health decisions (including sometimes not following their doctor's advice) as a result of information found on the web. A sizeable minority of Internet users in Europe also report having had an online interaction of some form with a doctor or health professional that they have not met. Although there is currently a lack of robust evidence on the impacts of these developments on the traditional doctor-patient relationship or on 'gate-keeping' mechanisms in healthcare, overall it seems that health-on-the-web has **not yet led to a substantial bypassing of the existing 'bricks-and-mortar' health system**. The 'grey' area of online marketing and purchasing of medications remains an issue, however.

Whilst health-on-the-web may empower in various ways those who have access to the Internet, the flip side of this is that **those who are not online** may become relatively more disadvantaged in relation to health matters. This is an issue of considerable importance for policy efforts to reduce health divides across socio-economic groups. Mobile telephony applications may offer some potential to help bridge the **'e-health divide'**.

Another focus of the analysis was on **home telehealth** and **telecare**, especially their potential to provide effective ways of delivering health and social care services to an ageing population in Europe. Many commentators have suggested that these offer considerable potential to deliver a **'win-win-win' scenario**, whereby the needs of older people are supported whilst simultaneously helping with cost containment in health and social care systems and opening up new markets for European ICT and related industries. Although many trials report quite promising results in this regard, the available evidence is still limited and there is a need for more robust assessment. In some cases, the technologies and applications are quite well proven, but the social and organizational aspects of their implementation seem to be a lot more challenging. There are also important **ethical issues** that arise in this area, such as maintenance of privacy and dignity when implementing applications involving surveillance of the home and / or lifestyle monitoring.

Overarching issues around how much emphasis should be given to technology-supported care in the search for solutions to the challenges posed by demographic ageing and about the implications of these applications for the sharing of caring responsibilities between formal care services and the family also need to be addressed.

Table 5: Summary of social impacts in the domain "health" across the four study themes

Rationalization	➢ 'Health-on-the-web' has made a lot more health-related information available, and more easily available, to consumers/patients ➢ However, the quality may be variable and there can be risks of overload, so good 'e-health literacy' skills are needed to get the most of this ➢ Some applications may also pose risk of increased transparency of consumers/patients vis-à-vis vested interests, e.g. insurers ➢ Home telehealth and telecare appear to offer considerable 'win-win-win' potential, through better care and more independence for consumers/patients (e.g. for older people), cost-containment in long-term care services and market opportunities for the ICT industry and other businesses ➢ However, organisational and other systemic barriers have been limiting factors, and important ethical questions remain to be addressed.
Networking & Social Capital	➢ The 'long-tail' of the Internet has provided unprecedented possibilities for consumers/patients to get in touch with and share experiences with others who have similar health conditions, even the rarest ➢ This increased access to social capital may provide the type of social support that has been shown to improve health experiences and outcomes, although more research on the

	comparability of online and traditional face-to-face support is needed. ➢ The Internet has enabled collective knowledge generation on health matters, e.g. user ratings of providers, collective content collation and 'publishing'
Empowerment & Participation	➢ Most consumers/patients who look for health information online report being better informed, and this can be brought to bear when making healthcare decisions and in interacting with doctors ➢ However, it is not clear how receptive are doctors to having a new and more equal relationship with their web-informed patients ➢ In combination with market liberalization, the Internet increases access to alternative healthcare providers (including alternatives to the mainstream system) ➢ However, there seems not yet to be much sign of any major trend to ignore one's doctor's advice or bypass the mainstream healthcare system ➢ There is the risk that online patients/consumers become more easy to target by health-related advertising / marketing activities (creation of 'un-necessary' demand), and there is the 'grey' area of online marketing and purchasing of medications ➢ Whilst many want to be empowered through more choice and influence, some do not want to take responsibility and others lack the knowledge/ competencies needed. ➢ Also, those who are disadvantaged and not online may now face a 'double jeopardy', with digital divides compounding existing health divides
Lifelong Learning	➢ 'Health-on-the-web' provides consumers/ patients with enormous possibilities for enhanced, self-directed, lifelong learning on health matters ➢ Successfully exploiting this to increase capacity for health self-management requires the necessary 'e-health literacy' ➢ Other ICTs also offer important possibilities, such as SMS text messaging and other 'push' applications to distribute targeted health information and education ➢ In some cases these may have better reach across social groups and thus help bridge 'e-health divides'

Implications for policy

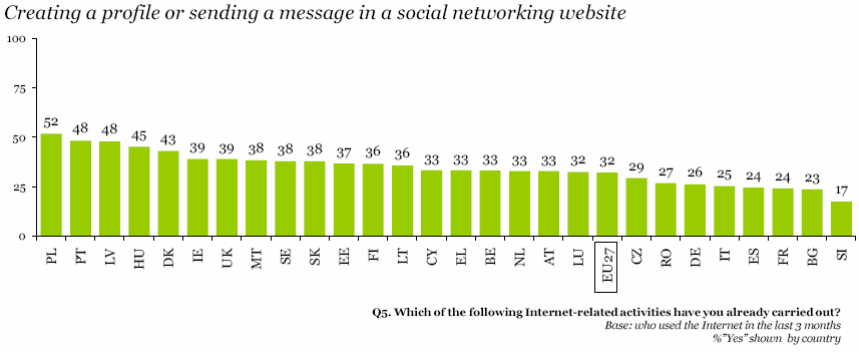
- Greater policy attention should be given to 'health-on-the-web'. There should be increased focus on this domain within e-health policy and more attention given to the important issue of 'e-health literacy' for consumers / patients. This could be supported by more in-depth benchmarking of developments across the EU, including surveys of users and mapping of the supply side.
- Support should also be provided to initiate and sustain an informed public and professional dialogue on the social and ethical aspects of telecare and home telehealth in long-term care for older people, and on how to achieve a balanced path towards the 'win-win-win' possibilities that have been espoused for this field. Actions at EU, national and local / regional levels should be promoted, bringing together relevant stakeholders such as policy-makers, user groups (older people, family carers), RTD/industry, long-term care services, social scientists and applied ethicists.
- Focused efforts should be initiated to address the cultural, organisational and other systemic barriers within healthcare that have tended to impede wider provision, integration and take-up of patient-facing e-health services. This should involve the Member States as well as other relevant stakeholders, such as professional associations, and be supported by research to improve the available evidence-base in this area.

- Support should be provided for more European-focused evidence gathering in this field, as much of the current evidence and research emanates from the US. This could include benchmarking, case studies, consolidation of available evidence, and multi-disciplinary studies, with an emphasis on cross-country research to identify European best practice and support policy coordination at the EU level.

3.6 Community and Family

Background

Our research in the domain of community and family focused mainly on the impact of the Internet and mobile telephony on **sociability** and the **quality of social interaction**. As people with stronger social networks tend to be healthier and happier, sociability and social interaction refer not only to the quality of individuals' social relations, including the family and the communities they belong to, but also to their wellbeing.



The share of Internet users who have already participated actively in online social networks is considerable in all EU countries, and is by no means limited to young people only. *Source: EB Flash 241*

The debate about technology's effect on sociability is not new. Not unlike in research on television in previous decades, the advent of personal computers and the Internet gave rise to fears about the '**death of community**' and the **slow demise of sociability**. While dystopians viewed ICT-mediated communication as necessarily inferior to face-to-face interaction, which it would tend to displace, utopians claimed that, by overcoming the constraints of distance, ICT would build connections between an increasing number of people, leading to better understanding, improved social cohesion, and ultimately leading to McLuhan's famous '**global village**'. Empirical research has shown that neither of these views properly reflects reality.

Key findings

There is clear evidence that use of the Internet and mobile telephony are conducive for **social capital** where people are already equipped with the capability to create, maintain and exploit their social networks. For example, ICT makes involvement in any kind of community easier, by providing effective tools for communicating within loose networks of contacts and by participating much more efficiently in a wide range of decision-making processes.

This applies to '**communities online**' (traditional communities originally based on face-to-face contacts, where ICT is used as an additional tool for communication and interaction) as well as to '**online communities**' (groups in which nearly all interaction is by electronic means, and which have developed in the virtual domain rather than through face-to-face interaction). ICT also enables families (and other tightly bounded groups) to cope with the increasing demands arising from the typical conflicts between, on the one hand, individual autonomy and flexibility, and on the other hand, the continuous need for coordination, monitoring, support and backup systems to hold the family together.

As far as the quality and quantity of social ties is concerned, ICT's effect differs between different types of ties. **Strong bonds** between people who feel close to one another, e.g. family ties and close friendships, tend to be strengthened by ICT use. The positive effect is even stronger for loose ties of people who do not know each other well, but who share common interests or roots. This is where many of the so-called Web2.0 applications have exerted their most powerful effect.

The empirical evidence concerning social interaction with people who are perceived to be 'different', i.e. what academics call **'weak social ties'**, is less conclusive. It appears that such interaction is suffering as it **has become easier to bypass unwanted social contacts**. In a social landscape characterised by increasing social inequality and fragmentation (as appears to be the case in many EU countries), such tendencies could prove problematic.

What follows from this is that ICT is not only transforming patterns and processes of sociability, but also **patterns and processes of social inclusion**, as manifested in the different capability of people to make use of technology for achieving personal goals and gaining access to social (and economic) resources.

The possibility cannot be ruled out that ICT makes it even more difficult for people at risk of social exclusion to improve their situation. There are many examples of initiatives that seek to utilise ICT with the explicit intention to tackle **social exclusion**: the available evidence suggests that such initiatives have a great potential for success, but that they rely on policy intervention (e.g. funding) coupled with strong involvement of grass-root activity.

Table 6: Summary of social impacts in the domain "community & family" across the four study themes

Rationalization	➢ ICT, in particular the Internet, make involvement in the community easier, by offering effective tools for communicating within lose networks of contacts and by lowering the effort for participating in decentral decision-making processes. ➢ ICT, in particular the mobile phone, enable families and other small, tight-knit groups to cope with the increasing demands arising from the typical conflicts between, on the one hand, individual autonomy and flexibility, and on the other hand, the continuous need for coordination, monitoring, support and backup systems to hold the family together. ➢ ICT lower the effort needed for keeping in touch with remote contacts, thereby mitigating the negative effect of distance on social relationships. ➢ In general, younger generations ("digital natives") are much more likely to full-heartedly embrace social uses of ICT and to integrate them seemlessly into their social behaviour patterns. This implies that they are more likely to be directly affected by any of the developments discussed here.
Networking & Social Capital	➢ The spread of social networks potentially has dangerous implications with regard to data privacy, exposure to unwanted content and communication, and exposure to criminal behaviour. ➢ ICT may be used by people with antisocial inclinations, which has led to challenges to security and difficulties in establishing a new balance between individual freedom and public safety.
Empowerment & Participation	➢ ICT has been shown to have a significant empowering effect as far as the ability of people to engage in sociability is concerned. ➢Interaction in virtual communities often leads to new or tightened social ties which provide users with access to resources needed for coping with "real life" challenges. ➢ This seems to apply, in particular, to the mobile phone, which has spawned a set of totally

	new social practices. These rely on individuals gaining an unforeseen degree of autonomy over communication within their social networks. ➢ With regard to families, ICT has empowered family members, in particular those under age, at the same time as it has provided new means of coordination and control. ➢ For people who tend to be too inhibited to participate in social exchange to the extent they would like to, ICT have been shown to be beneficial, at least in the short to medium term.
Lifelong Learning	➢ While social networks play a strong role in formal education as well, their greatest contribution to lifelong learning is in the area of incidental learning. ➢ ICT applications used for sociability, such as online social networks, introduce significant new/additional skill needs in order to protect the most vulnerable parts of society from exploitation and other harm. ➢ The majority of Internet users actively transfer ICT-related skills to their friends and family, as well as other groups of people – especially colleagues and co-students, respectively. Peer-learning, often through ICT and social networks, therefore plays a major role in updating the digital skills of users.

Implications for policy

- There is now robust evidence that ICTs are being used to strengthen ties between people who feel close to each other, or who share the same interests and background; this can, however, come at the cost of diminished social interaction with people who are perceived to be 'different'.
- Communication habits that reinforce existing social and economic fragmentations are potentially dangerous for an open public sphere, and for social inclusion.
- However, ICTs can also be effective in supporting efforts to improve social inclusion of those people who are most at risk of exclusion (e.g. because of disability or introversion).
- In order to make progress in this regard, initiative on the part of policy-makers will be required, ideally embedded in a concerted effort involving all key stakeholders.
- Policy action, particularly at the local level, should attempt to identify ways in which the potential of ICT can be exploited for improving communication between people from different backgrounds, and for addressing local challenges with regard to social exclusion. Much could be learned by exchanging good practice across Europe.
- The rapid spread of commercial social networking services such as MySpace and YouTube, and the emerging diffusion of cloud computing have led to concerns about excessive dependence on individual for-profit market players. The risks involved not only concern data privacy, but also data safety and user lock-in.
- A number of much-publicised incidences where social networking and web mail providers have lost private user data have shown that data stored 'in the cloud' are not safe. Moreover, as commercial providers are free to change features of their social networking services as well as the conditions for their use, users may want to change to another provider that offers a more attractive service.
- Users may also need to look for an alternative if they are excluded from a social networking site as a result of changes to the small print. This would imply - under current conditions - that the person in question has therefore lost access to their personal data stored on the site. This appears increasingly unacceptable given the importance that users attach to their social online identity.

- Europe needs to explore the case for new regulation which would give users the right of data portability, i.e. extracting their personal data from a social networking site, for example in order to switch to an alternative service.
- Market players should be asked to provide greater transparency about the way in which they will treat users' data in the case of shutting down or selling the service, or making fundamental changes to conditions of use.

3.7 Creation and Distributed Innovation

Background

In the creation domain, many experts have shown enthusiasm for the opportunities that have emerged in the context of new ICT, in particular the Internet. What does available empirical research say about the impact of such technologies upon the role of creative people, and on art in general?

One hope related to ICTs was that by lowering barriers to participation in the arts, arts communities would be able to reverse long-standing trends toward reduced funding by increasing rates of participation in certain types of arts. On the other hand, it was feared that the Internet would not only herald the 'death of distance', but also that of the local. Furthermore, ICT has been criticized as a means to lower labour costs for artists. There were also expectations that the boundaries between producers and consumers will get blurry, up to that extent that everyone is both a producer and a consumer of creative content, and that the division between the two does not make any more sense.

Key findings

Our research found that there is an increased awareness for certain types of art that did not attract that much attention before. On the other hand, in some fields of art adoption rates remain relatively low often due to a lack of useful applications, such as in classical music, opera, or dance. Meanwhile, some traditional markets for creative content have shown tendencies to dry up as the wide available of freely available content has reduced the willingness of the market to pay for professional work. Technology has in fact been used in some cases mainly as a means of reducing labour (artists) costs at the expense of quality.

Regarding the **'death of the local'**, there is countervailing evidence that creative expression still takes place to a considerable extent **within certain geographic and cultural communities**, since it is often deeply embedded in local practices and fostered by social codes which still rely on face-to-face interaction.

Such place-bound communities have increasingly developed, however, into nodes within international networks for the exchange and consumption of cultural artefacts. These rely heavily on ICT.

While barriers to creating content were relatively high before, ICTs enabled more people to produce content. One main area of interest, therefore, is the blurring of the amateur–professional boundary.

The popular so-called **Web 2.0 applications** further lower the bar to user participation by providing even more simple and easier to use interfaces as those serving similar activities before the advent of YouTube, MySpace, Facebook, Blogger etc. The share of Europeans

who use the Internet for uploading self-generated content at least once in three months was 20% in 2009, as opposed to 11% only one year earlier[12].

A growing number of participants is engaged in 'serious leisure': one general effect of related experience is that young people will grow up thinking that generating creative content is a normal activity. This view may contribute to there being more well-rounded citizens who are also more likely to engage in the consumption of cultural and artistic opportunities throughout their lives.

Table 7: Summary of social impacts in the domain "creation and distributed innovation" across the four study themes

Rationalization	➢ ICT have significantly decreased barriers to entry in the many for creative content and services. Web 2.0 applications, in particular, have acted as "infrastructures for whatever" which lower the bar to user participation by providing even more simple and easier to use interfaces. ➢ This has lead to a blurring of the amateur–professional boundary, which has benefited amateurs who now find it easier to engage in creative activities, to share self-created content with others, and to get involved in collaborative creativity. ➢ Within creative markets, these shifts have lead to tensions and changes in the power relationships between professional producers, intermediaries, and distributors of creative content. Some professionals now find it harder to earn income from their creative activity.
Networking & Social Capital	➢ Many (but not all) areas of the creative domain have become increasingly networked as a result of implementation of ICTs. These include music and video, photography, writing and information sharing. ➢ In these areas, we have already seen major changes in the underlying organizational structures. ➢ The large number of people who create, share and reflect on creative content online have certainly increased the overall level of social interaction, although the rewards in terms of social capital which can be used as a resource are more elusive and indirect compared to other domains. ➢ The ties that predominate are likely those representing bridging capital, building weak ties of similar but distant people. ICTs allow people with shared interests to connect in ways that would not have been possible otherwise. Already a significant share of Internet users benefit from this opportunity.
Empowerment & Participation	➢ The Internet, and Web 2.0 applications in particular, have greatly enhanced the ability of citizens to participate in the creation of content, knowledge and ideas. ➢ Technical barriers to participation have been greatly reduced. Web 2.0 services allow users to create blogs, photo sharing pages, music sites, and any number of other complex contributions to the Web with no knowledge of obscure technical codes. ➢ As a result, we have seen participation in the creation of content growing rapidly. ➢ Moreover, Internet users tend to show more satisfaction with the degree to which they can participate in social life.
Lifelong Learning	➢ Learning in the creativity domain has traditionally been largely informal, and the result of either self-teaching or peer-to-peer support. ➢ The Internet has significantly enhanced the possibilities for people to engage in this type of learning, by providing access to material for self-learning and by enabling people to get in touch with others who can share their knowledge and experience.

[12] Source: Eurostat survey on ICT Usage in Households and by Individuals

Implications for policy

- The increasing number of individuals who participate in the culture of contributing, remixing, and sharing content have up until now worked in a domain where copyright and ownership have not been clearly defined.
- Established interpretations of copyright and ownership of intellectual capital are being put into question by social uses of ICT, notwithstanding the (partly successful) attempts of the incumbents to cling to the existing regulatory paradigms.
- Professionals who produce information such as journalists, writers and to a certain extent academics might see their unique expert status suffer from the current 'cult of the amateur'. In particular, if larger producers start to commoditize the work of the prosumers, to sell it as their value-added, some type of policy intervention may be needed.
- Regulation needs to seek a balance between, on the one hand, the rightful interests of creators and copyright holders, and on the other hand, the capacity of ICT users to engage in the collaborative endeavour of innovation and creativity, which is bound to benefit society in the longer term.
- There is a need for continuous observation of the way ICT applications are being appropriated, in order to explore whether there is a need for policy intervention, i.e. to safeguard incentives for scientific / cultural work.

3.8 Comparing the situation in the EU with the rest of the world

While the core of our research was limited to collecting evidence relating to the situation in Europe, a complementary analysis was carried out to identify the main differences in the social impacts of ICT between Europe and other parts of the world, namely the **United States**, **Canada** and **Australia** as well as **Japan** and **South Korea**. Very little comparative research is available on this subject apart from statistical data on take-up rates and the activities for which people use the Internet, mobile phones and related ICTs.

Many of the early findings on the social impact of the Internet were based on research carried out in North America, which is the most advanced not necessarily in rates of uptake, but in the development of new services and applications for 'social uses' of the Internet.

This implies the danger that research findings from the USA are considered to be fully applicable to other advanced capitalist countries, which would ignore the extent to which there are important cultural differences between US Americans and, for example, Europeans.

Examples include the greater distances and greater physical mobility of North Americans, which often make face-to-face social interaction all but impossible, and the much more libertarian attitude with regard to data privacy in the private economy.

In both South Korea and Japan, development of ICT infrastructure and applications has been rapid in recent years, especially in the area of mobile (personal) communication technology and broadband (fibre to the curb). Strong public investment in ICT is mainly seen as necessary for economic development, whereas applications for strengthening civil society are all but absent. In the social domain, plans for deployment of ICT (e.g. ubiquitous computing) for addressing current challenges are ambitious, but it appears that they are too much guided by technological determinism, without taking proper account of the implementation contexts. For example, ICT-based remote work has been strongly promoted by the Japanese government as well as by some employers, but in practice take-up is low, arguably because working cultures continue to rely on face-to-face interaction.

ICTs have been taken up enthusiastically where they allow the nurturing of social ties, especially among tight-knit groups of people such as families and friends. The autonomy afforded by the mobile phone, for instance, is being perceived as strongly empowering, especially by individuals who used to suffer from strong social control, i.e. the youth and also, to some extent, women.

4 Generalizations and Recommendations

4.1 General Findings

Our analysis shows that the impact of ICT, as reflected in the findings from empirical research, tends to differ from earlier expectations, sometimes substantially. New ICT-based practices were often expected to replace established forms of practice, thereby revolutionizing the way people live, work, consume information and learn. In reality, however, practices based on ICT have often turned out to have a complementary effect, **enhancing and subtly changing societal patterns and trends**. Of course, ICT-enabled change can indeed have substantial and lasting effects on European society, but it does so in complex ways which do not follow the assumed logic of **technological determinism**.

Rather, social impacts of ICT depend strongly on the interrelation between characteristics of the specific applications at stake, and the long-term societal trends within the countries in which ICT is being introduced. However, the impact of technology may differ considerably from the intended purpose. Therefore, expectations and assumptions in regard of technology change over time, and older expectations and assumptions often become forgotten. This is why even extreme differences between early expectations and assumptions and factual developments remain only unsystematically reflected, if one does not reconstruct the related change. Only then one may become able to fully grasp what can be learned from such changes of perceptions. Historical analysis is therefore of particular importance when addressing actual decisions that may affect future technologies.

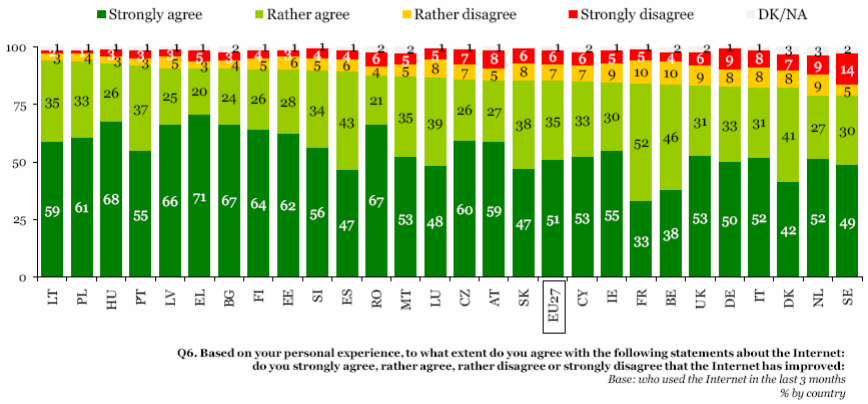
Using the four main themes which were identified to guide our related analysis (rationalization; networking & social capital; empowerment & participation; information & lifelong learning) we briefly outline below some of our main findings.

In all of the domains covered in the study, ICT was considered to have a significant *potential* for **rationalization**, i.e. for increasing the efficiency of established processes and systems, mainly by exploiting its enormous capacity for collecting, processing, and distributing data. However, data always have to be interpreted to become information, and expertise is not only dependent upon explicit information, but on trustable implicit knowledge as well. Not all measures dedicated to increase rationalization have succeeded, and the means and extent of such attempts vary strongly across the domains.

In many cases, the Internet has greatly improved people's access to information which is of relevance and/or interest to them, which implies that they – if endowed with the necessary skills – have benefited from **greater transparency**, e.g. in the domains of consumption, education, creation and community, and family. However, greater transparency has not always had a tangible effect on actual practice. In the area of participation in policy making, for example, there has been little if any measurable effect of online activity on formal policy making in Europe, the realization of which might even lead to a backlash against such well-intended e-participation initiatives.

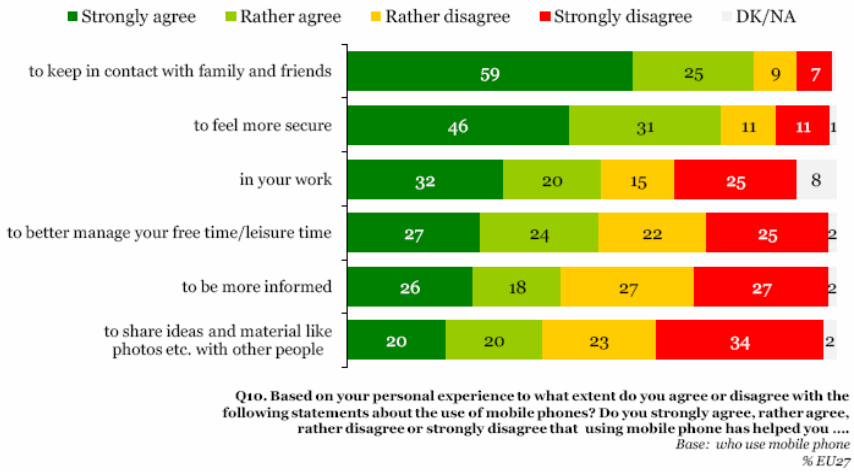
Greater transparency enabled by the Internet has a flipside, which is the **opportunity for greater control in the hands of the powerful**. The Internet and, maybe even more important in the near future, mobile telephony, have opened up a range of new possibilities for organizations which seek data on customers, citizens, potential friends and competitors. This clearly represents a rationalization opportunity in the field of control, as the costs of screening individual behaviour have decreased dramatically thanks to more and more human activity taking place online and / or with the help of a mobile computing device.

In the consumption domain, the fact that the Internet can greatly **reduce transaction costs** (such as search costs) has allowed for direct interaction between supplier and consumer, thereby dispensing with the need for any intermediation. However, in practice there is evidence for **re-intermediation**, i.e. an explosion of intermediation points can be experienced in digital markets, rather than the opposite. Similarly, in the context of globalization, the global was expected to replace the local. However, globalization and localization have taken place at the same time. Furthermore, the expected post-industrial society turned out to be more of a modernized industrial society.



There is almost universal agreement among Internet users that the technology has improved their capability to be informed about issues of interest. *Source: EB Flash 241*

The efficiency-increasing impact of ICT is compromised, to some extent, by **challenges introduced by ICT-based communication**. An example is **spam** (unsolicited bulk messages), which can be highly annoying. The issue has been addressed by the EC directive 2002/58/EC, which demands prior consent of the user before sending him/her unsolicited commercial electronic messages. Still, additional non-legislative measures will be necessary to minimize risks related to unsolicited communication. Some scholars have suggested making greater use of the Internet community itself to 'police' online conduct; for this, methods for peer-production of information such as social tags and ratings could be used.



The mobile phone has revolutionized the way people manage their communication within tight-knit groups of friends and family. It remains to be seen what impacts the increasing merging of Internet access and mobile communication will have. *Source: EB Flash 241*

When it comes to the effect of ICT on **networking and social capital**, it is obvious that the networking capabilities of the Internet and ICTs enable collective endeavours which would have been unimaginable before. There is evidence for significant impacts of such behaviour from all of the domains analysed presenting this report. **Peer - production** of user / citizen feedback, collaborative tagging, social indexing, etc. have taken off with the advent of the so-called Web 2.0, which greatly **reduced the barriers to participation in collaborative online activity**. There can be little doubt that the share of the EU population engaging regularly in collaborative creative activity has increased significantly as a result of these developments.

Concerning the type of social ties which are most affected by the new possibilities of networking, it appears that individuals use ICT predominantly to get or remain in touch with people they already know, and with strangers who they share interests with. There are some indications that, as a result, linking social capital, i.e. social ties with people who are 'different', could suffer.

Thus social capital seems to be more a pre-requisite for, rather than a consequence of, meaningful ICT-mediated communication. In this context, the freedom to choose one's own communities may have the negative side effect that experiences with other communities are filtered out; that the technology enabling a global public sphere may contribute to its fragmentation.

This refers directly to the third theme applied in our research, namely **empowerment and participation**. The widespread adoption of ICT for an ever-increasing range of purposes has had a positive impact on feelings of empowerment, as reflected in results from survey research. For example, most users of online health information report positively about the experience of being able to find and discuss health-related information online, in spite of the fact that many of them have encountered confusing or biased information. Consumers benefit from easier access to independent information about products, for example on price comparison websites. People with interest in creative activities find it much easier to exchange self-created content or to engage in **collaborate creativity**. Europeans with an active interest in policy-making tend to report that they, too, benefit from greater transparency and access to scarce information, but there is widespread frustration with the lack of influence on the formal policy-making process.

In general, ICT has been shown to have a **significant empowering effect** as far as the ability of people to engage in socialising is concerned. This applies, in particular, to the mobile phone, which has spawned a set of totally new social practices. These rely on individuals gaining an unforeseen degree of autonomy over communication within their social

networks.

When certain members of society are empowered on account of ICT, however, established power structures are being put in question, which typically results in defensive strategies – for which ICT offers powerful applications, as well. For example, children who are equipped with a mobile phone are benefiting from greater autonomy about their communication behaviour, but parents can use the same technology to extend their control across space and time, e.g. by using location-based mobile services with which to track the current location of their offspring.

Empowerment is also potentially endangered by **strong dependence on individual service providers**, the conduct of which is often determined by commercial considerations rather than the public good. In a similar vein, the use of ICT at the workplace has enabled the possibility of empowerment of staff, but for its full-scale observation by the employer, as well. In this respect, issues which need to be followed closely include **data privacy**, **user lock-in**, and **consumer rights**.

Another source of danger is people with antisocial inclinations, of which terrorists who use the Internet to jointly prepare crimes are only the most obvious examples. Criminal activities may violate ICT systems by attacking it with malicious software such as viruses, Trojans, worms, spyware etc., but ICT can also be used as a means for criminal activities such as theft or fraud (identity theft, 'phishing'), child pornography, harassment or stalking, to name a few.

A key feature of life in the information society is the need, for all people, to engage in **Lifelong Learning** in order to keep up with the changes of necessary practical knowledge. For this reason we need to explore the impacts of ICT on people's ability to continue learning throughout their whole life.

There can be little doubt that the widespread take-up of the Internet means that access to content which can effectively support self-learning has become much easier. Indeed, empirical evidence indicates that most Internet users perceive the Internet to be **supporting them in informal learning**, for which social networks are a particularly effective means.

The Internet has also acted as a major push for **collective knowledge generation**, e.g. user ratings, content 'publishing', and online self-support groups. Web 2.0 applications have also made it much easier to create **Communities of Practice** (COP) in which users exchange knowledge and experience, thereby fostering processes of individual and collective learning.

While Internet applications have made learning easier, they have also introduced a **range of new competences required** to fully participate in society, and to avail of the possibilities afforded by ICT. For example, being an informed online consumer requires skills in avoiding online fraud and other types of risks originating from commercial interests or malevolence.

4.2 Cross-cutting implications for policy-making

With regard to implications for policy-making, apart from the issues concerning individual domains (discussed in section 3), our research has pointed out a number of cross-cutting issues, briefly discussed below; these relate to ICT use and data privacy; user skills; and social inclusion.

ICT Use and Data Privacy

In the field of ICT use, data privacy has attracted public interest episodically, often at the occasion of scandals around related crimes. Legally, the situation in Europe is more protected than in many other parts of the world. However, there is evidence that some users do not care about giving up a large extent of their data privacy if they are offered what is

perceived as a valuable and useful (or even indispensable) service in return. Data privacy issues are bound to become even more serious in the future, in particular with regard to the expected wide diffusion of location-based services, social network applications, smart products and services registering ever more consumer data (e.g. through applications of radio frequency identification (RFID) or the Internet of Things (IoT)).

In relation to RFID and IoT, new potentials and new dangers have emerged. Not only material goods, but also animals and even humans (for example, staff in high security areas) have become 'identifiable' (and inter-relatable) by technical means. These technologies have the potential to enable practices almost as far removed from the emancipative 'identity' conception of European Enlightenment as Orwell's '1984'. Therefore, it is good that the European Commission has for quite some time observed these developments and started to promote legal and organizational frameworks to assess and secure privacy. RFID and IoT will surely only ever increasingly affect important branches such as logistics, maintenance and even agriculture, as it allows ICTs to be directly related to material things. This development needs to be critically observed.

Needless to say, in domains such as health, education and work (to mention only a few) new regulations may also be demanded. Regulatory frameworks have to seek a balance between the freedoms and the risks introduced by ICT. This will require continuous screening of market developments, user behaviours and stakeholder perceptions, and fast adaptation of the existing framework if change is considered to be necessary.

Regulation alone will never be enough. In concrete cases, Initiatives to develop technological alternatives, develop user skills, and nourish interaction culture far beyond netiquette (rules of politeness and correctness on the web) must be stepped up. This will demand the inclusion of consumers, citizens, learners, networking and strategic skills as well as generic types of cultural competences, such as the capacity to collaborate with people of different social and / or cultural backgrounds. Obviously, this also implies a great challenge for education.

User Skills

Scientific research has shown that many of the new skills which are needed for successful participation in the information and knowledge society are acquired – partly or even mainly – via learning 'by doing', rather than through traditional methods of education. This explains why individuals who are at risk of social exclusion – for reasons relating, for example, to age, ethnic background, educational attainment, location, cognitive capacity or disability – are likely to suffer from low levels of more advanced digital and IS skills. It is for this reason that groups that are most at risk of falling victim to commercial exploitation or other harm (children, people with low literacy more generally, the disabled) must be targeted, as a first step, by initiatives to improve their digital consumer skills.

There is a wealth of socio-economic research to suggest that for investments in ICT to fully exploit their potential, they must be complemented by investments in qualification. While it is common practice to pay lip service to this observation, it is all too often un-reflected in the way investment decisions are taken in reality. It is not understandable that there are still investments in business innovations without related investments into qualification and organizational development. Policy makers should ask recipients of public subsidies to design their investment plans accordingly.

For example, the large share of Structural Fund budgets which is spent on ICT should be made dependent on potential beneficiaries providing evidence that hardware and software investments were adequately complemented by investments in 'soft' factors such as trainings and user participation in system implementation. Still, it is not enough to ask for qualification

methods *after* technology implementation, but technology applications themselves have to be made supportive for competence promotion. We shall come back to the latter two points when discussing consequences for further research.

Social Inclusion

Social inclusion in the information society remains an area which will require policy intervention over the coming years. While take-up rates of the Internet and broadband are high, the share of citizens who do not have the material or cognitive resources to make meaningful use of the Internet is still considerable. This divide will not disappear by itself.

This implies that efforts to close the digital access divide (i.e. give all Europeans access to broadband Internet at attractive conditions) need to be continued and further developed in the light of new technological trends such as Mobile Internet. They need to be complemented by activities for helping people acquire the necessary user skills, and continuously update their competences throughout their life.

Since it will be many years before every European has good access to the Internet, and fully understands how to make appropriate use of it, alternative channels for interacting with individuals must be maintained. As more and more transactions in all social domains take place online, there is the risk that people who lack access and / or user skills will be left to cope by themselves. This would be unacceptable.

Therefore, all suggested policy making in the information society area should be analyzed systematically to check for likely impacts on those who remain offline, and for related solutions.

It might be useful to establish a standing advisory committee for this purpose, similar to the 'High Level Group on Employment and Social Dimension of the Information Society (ESDIS)', which consisted of representatives from all Member States and made a valuable contribution to the policy making process at times of the eEurope Initiatives. This would help ensure that country differences in potential impacts of policy making on Europe's offline-population would be taken into account.

New ICT-related risks to social inclusion are emerging continuously. Scientific observation of the way new ICTs diffuse, and are being appropriated by people, needs to be a continuous activity.

Special emphasis should be given to the empowerment of poor, handicapped or otherwise marginalized individuals, for example, migrants. European e-inclusion policy should continue its attempts to make ICTs become empowering for such individuals. Such tools for empowerment, for instance use of Web 2.0 applications for helping people with limited language skills to negotiate public service sites, should be linked to a promotion of social organizations on the ground, e.g. community or youth centers. The social competences available in such organizations will help to develop and spread empowering applications, to support face-to-face community building with remote communication, and to develop e-skills among marginalized individuals.

4.3 Consequences for Future Research

The unexpected social impacts of ICT observed in this project (or at least impacts that proved to be different from what had been assumed) show that the approach adopted here is fruitful and could be used more. It certainly is not the regular approach. The regular approach is to extrapolate from the expected characteristics and opportunities of ICT and to imagine or estimate where they could lead to in human lives, organizations and society at large. As explained above, there is a naive design-bias in this approach, which identifies the intended purpose of an anticipated artefact with factual impacts of related socially established applications. We showed throughout this work that such identification leads to incomplete, if not fully erroneous conclusions.

Therefore, in this project the opposite approach was taken: that is, to extrapolate existing social and societal trends, to describe and analyse what has happened in a number of social domains in the last 25 years and finally to establish what impacts ICT already has had on these trends and domains, and what can be expected in the near future. This results in a thoroughly empirical approach that is grounded in social reality and not in technological forecasting. Scenario building and estimations based on technological opportunities can be valuable for developing strategy, but they only overcome speculation when they start from solid empirical and theoretical research.

That factual impacts of socially established applications often differ from the intended purpose of anticipated technology functionalities has implications for further technology research. It should also have consequences for technology development and related funding. In the following, we, therefore, present some consequences for EU-funded R&D of ICTs and then address issues for further research around the four core themes.

(1) EU-funded Research and Development

EU-funded ICT Research and Development (R&D) is only one financial source besides national and private funding. Nevertheless, it has increased significantly over the past years and has become a considerable contribution to innovation policies in Europe. Actually, a total of € 9.1 billion have been allotted to ICT R&D within the EU's Seventh Research Framework Programme (FP7) for the time from 2007 to 2013. This makes ICT the largest thematic area in the cooperation programme, the largest specific programme of the FP7, which covers 64% of the total EU research budget. Furthermore, EU-funded R&D is not without effect on national and private funding policies. Therefore, it is important to ask what can be done here when one follows our non-determinist stance.

R&D is sought to be a synergic combination of research and development. Therefore, research should not only start when technology development has already been finished, but guide technology development right from the start in a formative manner. This demands for an applied form of development (a flexible, iterative R&D), but also for a type of research which does not confuse own intended purposes related to anticipated technology with factually and legitimately establish-able applications.

To develop technologies for situated use, related research beyond lab studies has to become commonplace. Research should be conducted already at early stages of the product life cycle to be a source for learning-in-(design)-practice. Studies may identify established practices in anticipated domains, e.g. by ethnographical research, but also study emergent technology use forms by means of prototyping or other situated methods (mock-ups, simulation, etc.) It should be commonplace for technology development to be framed by feasibility and evaluation studies. Research conceptions such Living Labs, Action Research, Workplace Studies or Business Ethnography (to name only a few) help inform the progress of the development process.

It is important to take into account that most groundbreaking innovations of the recent time such as "web 2.0" were generally not that revolutionary in technological terms: similar technical solutions have sometimes even existed before. What has given the new products their massive innovative impact is that they became appropriable for non-experts, for instance, by increased usability and more tailoring to the needs of users. This shows why the inclusion of socially relevant groups in the exploration / development of technology may enhance the innovation potential of technologies.

More research on the social impact of projects which aim at contextualized technology is needed, but also on fields which were not seen as being based on computerization, even when they had strongly become affected by it. In the fluid field of ICTs, research is needed to identify misconceptions, which are often related to a lack of knowledge about institutional and habitual circumstances in the anticipated technology application field. One example showing the growing awareness among technology experts for the analysed necessities of socio-technical Research and Development is the *European Society of Socially Embedded Technology* (EUSSET)[13] which only recently has been founded to promote human-centred design.

Experience shows that a lot of needs related to new technology can only be formulated during the process of development. If the creative use of technology is to allow ICT users to co-develop applications, become "prosumers" and detect new, often unexpected and sometimes promising markets, R&D has to become more sensitive to the unexpected. This is a strong argument for the participation of all parties concerned into development: industries, developers, researchers, distributors and users with their representatives, etc.

Although technology projects need a deep and synergistic cooperation between the project partners, one should be cautious with early fix definitions of the anticipated product. As an alternative, project management may include discussions with funders and relevant groups (e.g. consumer and producer representatives) about results in an early stage of the project. Such activities do not necessarily have to follow a control paradigm (e.g.: "further funding only in case of compliance of project performance with pre-given requirements"), but could instead encourage a more open discourse on unexpected lessons-learned, and on consequences. Strong industry initiative and influence in technology projects should be balanced by end-user participation in R&D – a. o. by Participatory Design. Otherwise learning might take the form of unpleasant surprises when the technology is offered on the market.

Finally, it must be stressed that socio-technical research is required to estimate the social environments where the latest ICTs will be used. For instance, ubiquitous computing and ambient intelligence are on the rise. The success of such technologies fully depends on valid and reliable knowledge of the social and individual human contexts where they are supposed to work.

(2) Important foci for further research

Four parallel themes ran through all the domain studies undertaken by this project. They all require further research. A number of priorities are highlighted here.

Rationalization

Under the theme of rationalization we not only had to study the impact of ICT on production systems and the economy, but also consumption patterns and everyday life. Why do so many ICT projects fail, last much longer, and cost much more than expected? Often the most important reason is that social and organizational conditions have been ignored. There has

[13] See: http://www.eusset.eu/

to be more research on these conditions and more research from a user perspective, both of organizations and individual users. Such research is, at least, needed before and after related development projects.

This also goes for the social infrastructure of daily life where fundamental changes are occurring that are hardly noticed. Here rationalization might mean an improvement of the quality of life, but also a more business-like life directed by electronic calendars and continuous registration. What are the actual user needs here? Who is defining them?

Networking *and Social Capital*

Under the theme of networking and social capital the networked character of many current ICTs was emphasized as one of the main transformative impacts of ICT. However, in a number of domains the consequences of this networked character are still far from clear. Will they lead to actual reversals of traditional social and economic activities such as the reversal of value chains by prosumers and publishing by citizen journalists? What is the role of ICT networking in the current financial and economic crisis?

One of the other impacts of networking consists of increasing or declining resources derived by individuals and communities for building social relationships and careers. The project found evidence for increasing resources of social capital for everyone, but also more differentiation and a danger for linking social capital. This can be related to increasing relative inequalities of benefits in using ICT. What strategies exist to prevent ever increasing inequalities?

Empowerment *and Participation*

The third theme was empowerment and participation. The project found many new opportunities in adopting ICT to improve the position of citizens, consumers, employees, patients and students. In the perspective of so-called Web 2.0 they are able to fill the initial applications of broadcasting and relatively passive consumption on the Internet with their own user-generated content. However, the contributions of active citizens, consumers, patients and the like also appear to fit hardly, or not at all, in conventional institutional structures.

For instance, there is scarcely any influence of citizens in policy making yet and most Internet contributors are still considered to be amateurs rather than professionals, whether they use collective intelligence on the Web or not. Where and how can empowerment become real instead of remaining utopian? What does this demand of institutional structures? For instance, how could the increase of user-generated content be used for empowerment?

As already mentioned, linking social capital is vital for any society, but it will not automatically be created or strengthened by ICTs. Public intervention for fostering social innovation will be necessary. To do so, European technology politics should continue its attempts to make ICTs empowering for poor, handicapped or otherwise marginalized individuals. Examples include efforts to improve the integration of ethnic minorities.

New forms of such empowerment should be combined with existing social initiatives, e.g. community, youth or other local centres. The social competences available in such organizations help to develop empowering applications, support face-to-face community building with remote communication, and develop e-skills among marginalized individuals.

Information *and Lifelong Learning*

The final theme was information and Lifelong Learning. Here the project observed many types of informal learning with the aid of ICT, or while using ICT that departs from formal and institutional types of learning. This occurs in all kinds of practices and appears to take place throughout life. The main problem is that educational institutions do not prepare people enough for this kind of learning, but accept a growing gap between formal education and informal learning with ICT. The number of computers and Internet access in schools is a related indicator. However, the most important point is if pupils and students are unrealistically expected to 'learn' today's (exponentially growing) knowledge, or if formal education succeeds in selecting an exemplary part which then helps learners to further elaborate their knowledge, while the overall focus is on critically learning how to learn.

Not only does formal education have its problems; informal learning is also problematic. For instance, learners may feel 'lost in cyberspace' due to a lack of strategic media skills, but also due to poor usability of applications. Furthermore, industry and business demands flexible autonomous learning – but does not necessarily repay the individual's efforts. Certificates and credentials have not become less important in times of growing informal learning. So how can certification and remuneration schemes in education outside the school be organized? Which institutions could help to make informal learning easier and more supportive and enjoyable for the learner?

All these questions relating to ICT can be related to three core complexes. The first is how people use ICTs within the given socio-technical distribution of work, wealth and power. The related aim has to be the accomplishment of **legitimate circumstances**. The second question is how ICTs affect the way in which people exploit and protect nature. The related aim has to be **sustainability**, a complex issue that has not been explicitly addressed in this report. The third complex issue is the way in which people learn about the interdependencies of socio-technical change and the potentials to influence it according their interests and ethical norms. The related aim is **responsibility**. It is within the European tradition to accept the fact that these aims can be seen from differing (and conflicting) points of view. That makes them even more important, in particular, in technology politics.

Instead of proposing new domains or application fields for further R&D, we focus on pleading for ongoing research and discourse at the meta-level: **how are the three general aims described above affected, evaluated and addressed by current socio-technical change?** One related focus on the meta-level is the question how to learn from important practical cases. A second focus relates to the question how practices within technology design and -use can be made more supportive for what is regarded as precious within the living environments of the citizens, and vice versa.

5 Annex: Findings from Flash Eurobarometer

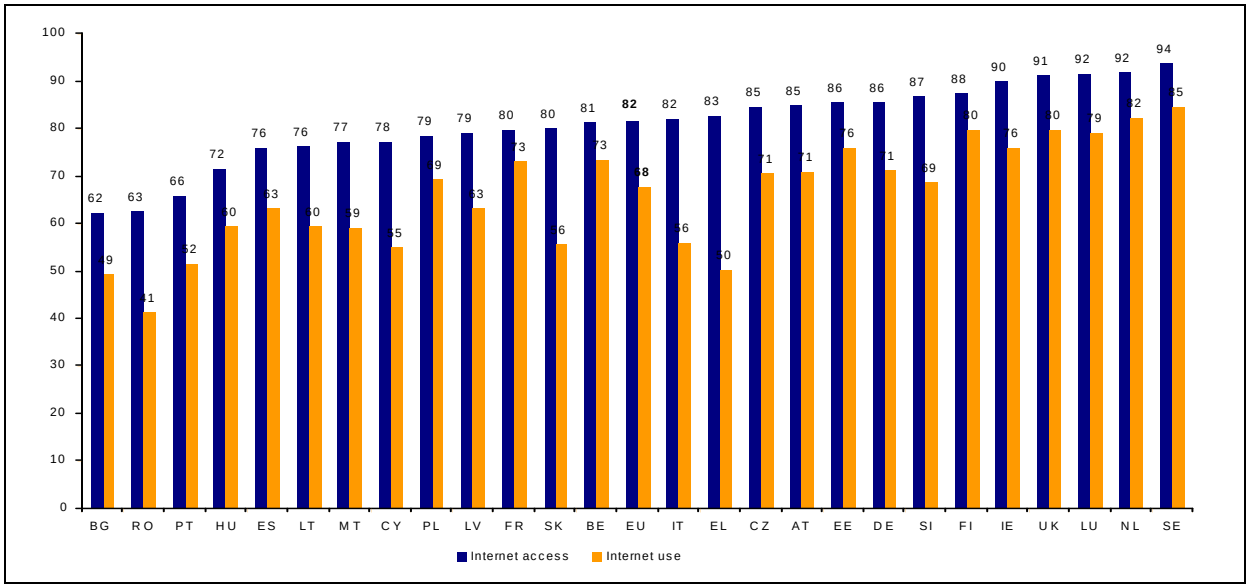
5.1 Topic and purpose of this analysis of the Flash Eurobarometer 241 survey

This report concentrates on analysing the data of the Flash Eurobarometer 241 survey ('Information Society as seen by the EU citizens'). One aim of this report was to support the topic reports of the "Social Impact of ICT" project with statistical material. However, the report at hand could be little more than a starting point in this regard, as it represents a snapshot of a given time point, while the topic reports on the social impacts of ICT had to analyze historical developments and future trends. The study at hand was to analyse empirically the relationship between ICTs and social capital, which was defined as a key, overlapping horizontal issue of the domains of the Social Impacts of ICT project. For us, social capital is mutual help, support, trust, shared norms and positive expectations between people, which help the members of the community to achieve their goals.

The effect of ICTs on social capital is heavily debated among academics. Some evidence suggests that time spent on the Internet substitutes for time spent socially face-to-face. However, some suggest that the Internet also creates a different, online social capital, and there is also evidence that the Internet helps to maintain existing social contacts. The cross-sectional nature of the Eurobarometer data limits our ability to identify such effects, too. We can observe relationships, but we cannot fully identify the underlying causality, whether the Internet has had a positive effect on social capital, or whether social capital has influenced positively the uptake of ICTs. However, the database also includes subjective-opinion questions on the effect of ICTs, which can help to overcome this missing link in the analysis. Additionally, the database is exceptional for analysing the relationship between ICTs and social capital in the way that it covers 27 member states with different Internet penetration levels and cultural backgrounds.

5.2 Internet access and use, and opinions about its social effects in Europe

Figure 1: Internet access and use by country



Data source: Flash Eurobarometer 241

According to the survey, which is representative for the EU adult population aged 15 or older, 82% of Europeans have access to the Internet. Sixty-eight per cent of the citizens also use it.

The remaining 14% have access to the Internet, but do not use it actively. In twenty-three of the twenty-seven EU countries more than 75% of citizens have access to the Internet.

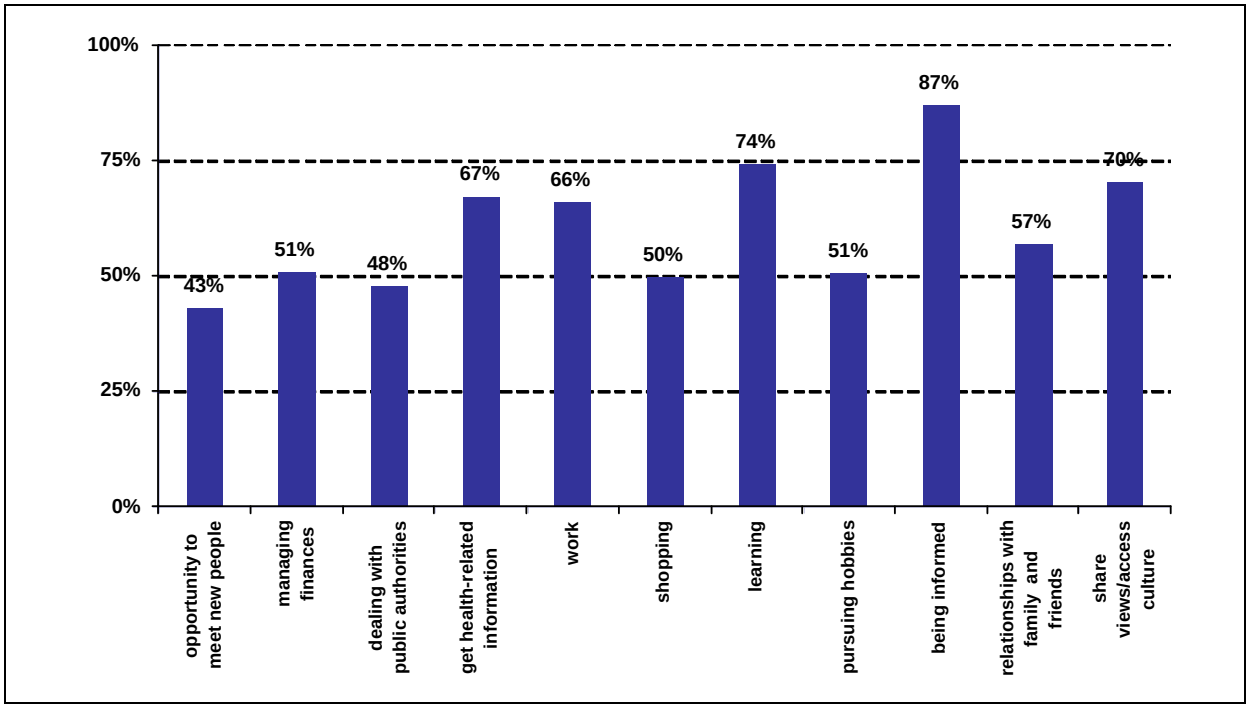
To what extent do Internet users perceive positive or negative impacts of using the Internet? Figure 2 shows the share of EU27 Internet users who agree that the Internet has had a positive impact on selected domains of their lives.

According to users' opinions, the Internet contributed to improvement of their lives especially in four domains:

- Obtaining information (Being informed about current issues: 87% agreement; Getting health related information: 67%),
- Learning (74%),
- Accessing and exchanging views about culture (70%),
- Working (66%).

In contrast, less than half of Internet users feel that the Internet has made it easier to meet new people (44%) and to deal with public authorities (48%). The figure is similarly low for perceived positive impacts on shopping (50%) and hobbies (51%).

Figure 2: Proportion of Internet users agreeing that the Internet has had positive impact on selected domains of their lives



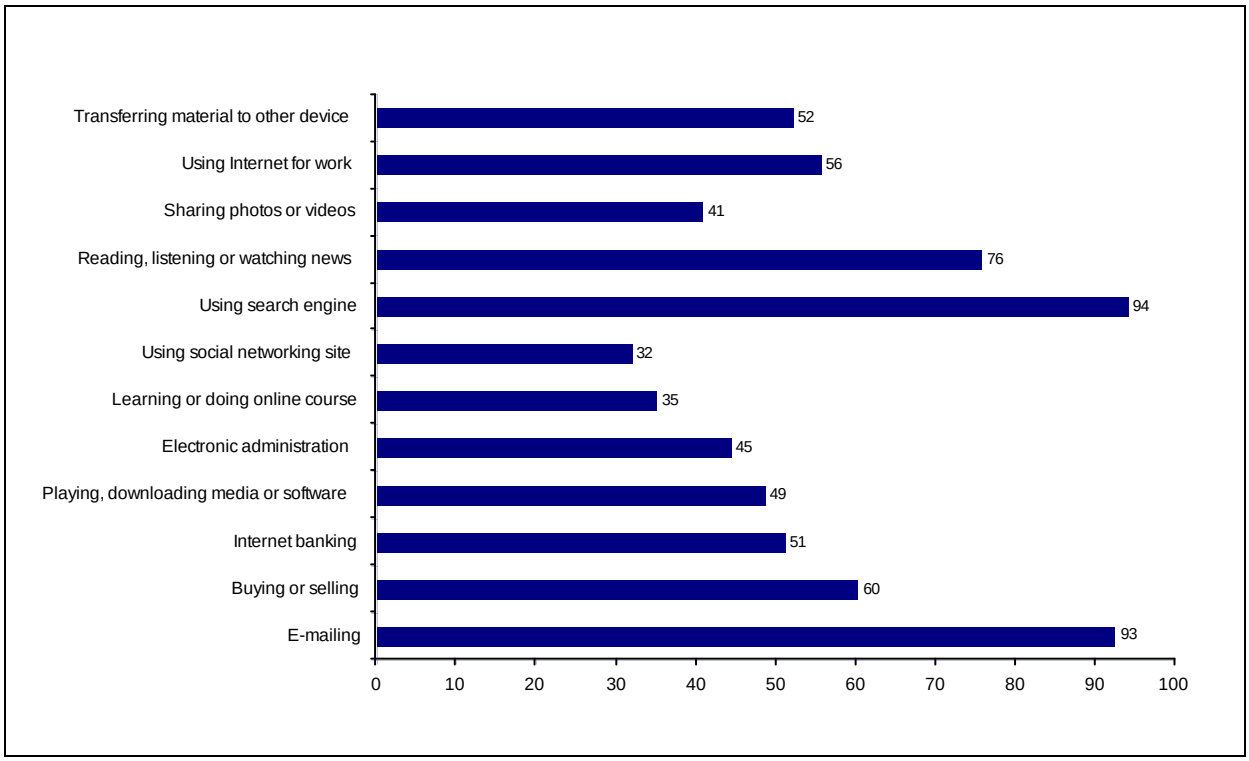
Data source: Flash Eurobarometer 241

These figures show that, while the Internet is perceived by a sizeable minority as helpful for interacting with new people, a much larger share of Internet users perceives positive impacts with regard to information retrieval, but also learning, working and accessing and communicating about cultural content. The latter activities typically include a certain element of sociability, which may explain the earlier findings according to which Internet use and sociability tend to go hand-in-hand.

The share of people who actually carried out these Internet activities (Figure 3) is close to the proportion of those who experienced improvement in their life domains. The greatest

difference is between those who experienced improvement in learning and those who have participated in online courses; the latter being significantly smaller. This suggests that the Internet's positive effect on learning is not only due to new techniques (such as online learning), but also due to use of the Internet for traditional educational purposes.

Figure 3: Share of users who have at least once carried out selected Internet activities (%)



Data source: Flash Eurobarometer 241

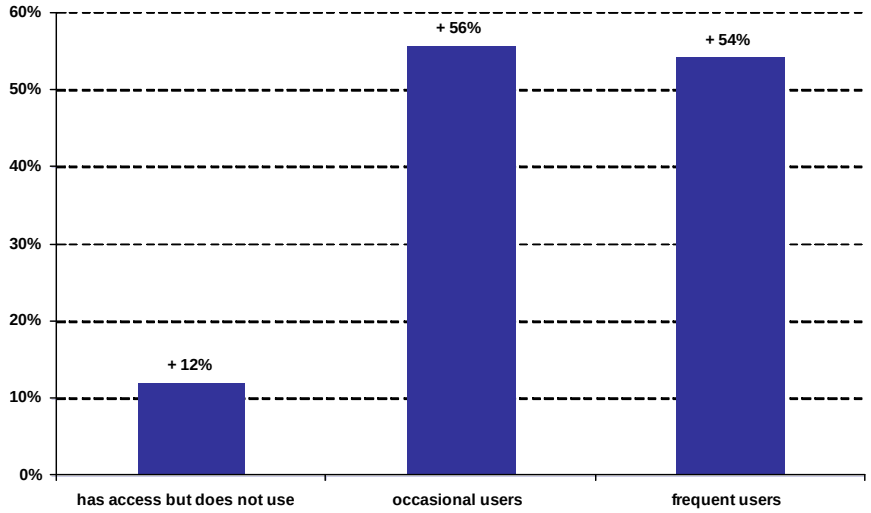
5.3 ICTs and social capital

Our analysis sought to establish evidence about the relationship between patterns of Internet use on the one hand and social capital on the other. Trust and civic activity levels are two measures which characterize social capital. Civic activity is understood as active participation in the activities of sports clubs, religious or voluntary aid organizations, trade unions, campaign other organizations.

We found that Internet users are associated with an increased likelihood that they are engaged in civic activity, independently of the effects of social background. This finding is especially important, as scholars have raised attention to the potential eroding effect of ICT on face-to-face relationships; our analysis of the Eurobarometer data suggests, on the contrary, that Internet use and active engagement in the social sphere tend to be related.

The probability of Internet users' engagement in some civic activity is approximately one and a half times higher than those without Internet access (Figure 4). There is, however, no significant difference between occasional and daily Internet users in this respect. It doesn't, therefore, make any difference for the likelihood of engaging in civic participation whether the Internet is used every day or only a few times per week or month.

Figure 4: The effect of Internet access / intensity of Internet use on civic participation



Baseline category: no Internet access. Each bar indicates changes of odds compared to the baseline category in being active at least weekly in organisations (sports clubs, religious or voluntary aid organizations, trade unions, campaign organisations etc.). Frequent users are those who use the Internet at least once a day. Occasional users are those who use the Internet less frequently.

Data source: Flash Eurobarometer 241

Internet use is also associated positively with generalised trust level: Internet users are significantly more likely than non-users to express high rates of general trust in people. As is the case for civic participation, within the category of Internet users there is no substantial difference between daily, and less frequent, users in terms of general trust.

On the basis of the sociological literature a conceptual typology Internet usages could be constructed, distinguishing between three types: recreational, resource enhancing and instrumental Internet use (Table 1).

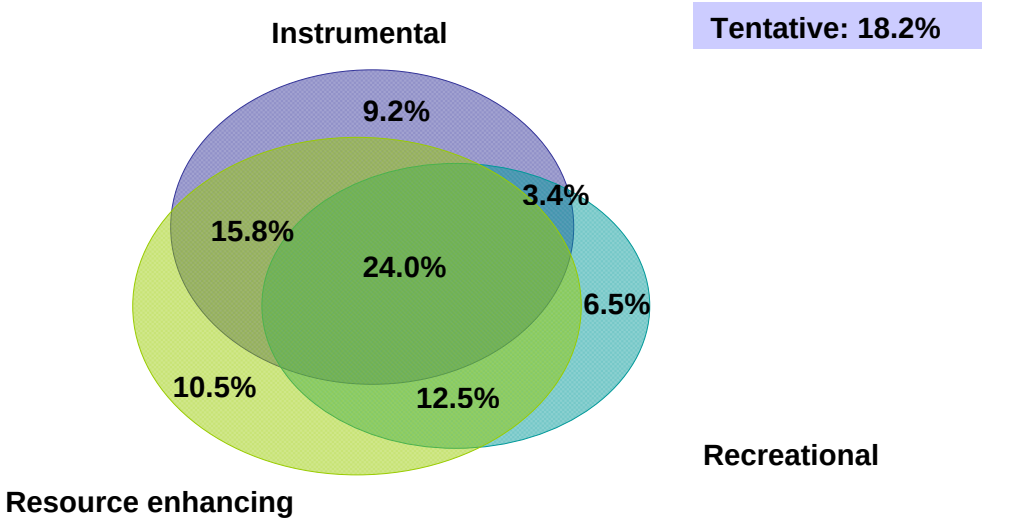
Table 8: Typology of Internet uses based on the literature

Recreation	Resource enhancing	Instrumental
Playing and downloading	Learning online	e-Banking
Sharing media	Social networking	Buying and selling
Transferring to other device	Following the news	e-Government
	Work	

Source: The authors

A person is considered to be a recreational, resource enhancing or instrumental user if they pursue more of the respective activities than the average Internet user. Average recreational, resource enhancing and instrumental uses were computed on the bases of standardised (Z-score) values of the respective activities. There are overlaps between the three types of Internet use. 24% of the EU27 Internet users are classified as 'all-round users', who make not only recreational but also resource-enhancing as well as instrumental use of the Internet. On the other end of the spectrum, 18% of the online population are what may be called 'tentative users' of the Internet: typically they use email and search engines only, and have not as yet engaged in more advanced applications.

Figure 5: Share of Internet users according to the type of use



"Tentative users" are the rest of Internet users, who are not considered in any typical usage modes due to under-average activity in each type. Their typical activities are e-mail and search engine usage only.

Data source: Flash Eurobarometer 241

The results suggest that, when it comes to explaining different forms of social capital, the activities which people carry out using the Internet are almost as important as the fact that a person uses the Internet or not.

While both instrumental and resource enhancing Internet uses coincide with a small, but statistically significant increase in civic participation, this is not the case for recreational Internet use (Figure 6, last column).

Again, as regards civic participation, instrumental and resource enhancing Internet uses coincide with a small, but statistically significant, increase in general trust. Recreational Internet use, in contrast, is not associated with social capital either in a positive or negative direction. The effects were present independently of the socio-demographic background.

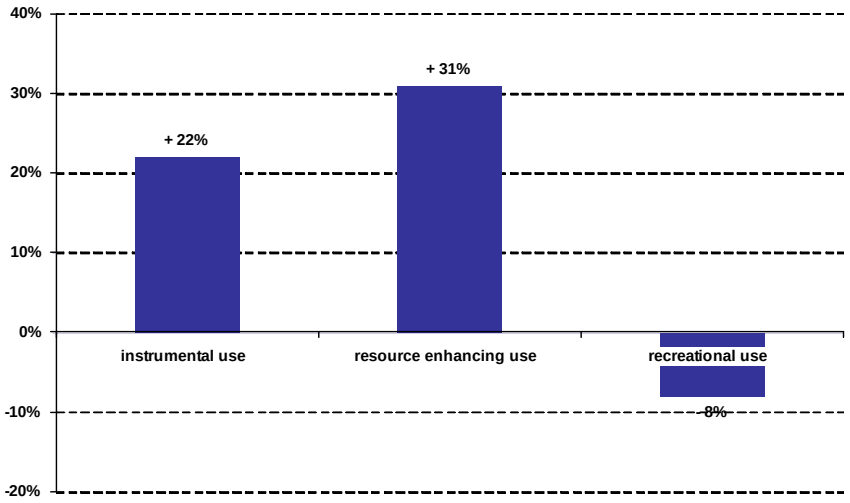
The positive association between resource-enhancing Internet use and social capital is stronger in countries where Internet penetration is low, while the relationship between instrumental Internet use and social capital is stronger in high penetration rate countries.

5.4 Conclusions

Our ability to draw conclusions for policy making is limited. The Eurobarometer provides us with cross-sectional data, therefore, when we observe correlations between social phenomena and Internet use, we cannot directly derive the direction of causality.

Nevertheless the results suggest that when social effects are taken into consideration, the type of Internet activity can be as important as the very fact of Internet usage. Policy making should, therefore, focus on fostering uptake of particular Internet applications rather than trying to increase Internet penetration rates as an end in itself. It is also notable, that the relationship between the ways of Internet use and the social effects can be different according to the penetration level of the country.

Figure 6: The connection between the type of Internet use and civic participation



Baseline category: tentative Internet users. Tentative users are those, who have shown less than average activity in each of the categories of instrumental, resource enhancing and recreational modes of use. Each bar indicates changes of odds compared to the baseline category in being active at least weekly in organisations (sport clubs, religious or voluntary aid organizations, trade unions, campaign organisations etc.)

Data source: Flash Eurobarometer 241